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Two Essays on Organizational Ambidexterity: The Role of CEO and Analyst Cognitions

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Two Essays on Organizational Ambidexterity: The Role of CEO and Analyst Cognitions

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Dedication

I dedicate this dissertation to my wife Jeonghyun, for providing me with endless cheerful energy throughout my Ph.D. journey. I never would have made it without her. It is also dedicated to my parents who inspired me at an early age to see the pursuit of knowledge as invaluable and worthy of a lifelong career.

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Abstract

Two Essays on Organizational Ambidexterity:
The Role of CEO and Analyst Cognitions

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Organizational ambidexterity, while generally considered desirable, is notoriously difficult to achieve and its benefits for firm performance are largely unclear. Across two essays, I examine the cognition of top managers and security analysts to better understand the challenges of organizational ambidexterity and how CEOs can support ambidextrous strategies that lead to better firm performance. In the first essay, I consider how CEOs cognitively juggle inconsistencies arising from simultaneous exploration and exploitation. I find support for the key argument that a CEO's cognitive complexity is a valuable resource for dealing with this challenge and benefitting from ambidexterity. Notably, I find that organizational ambidexterity is positively linked to firm performance at high levels of CEO cognitive complexity but I also find that the obverse it true: firms' performance is hurt when CEOs lack cognitive complexity. Contrary to the generally positive performance effect of organizational ambidexterity assumed in the literature, this study finds that performance benefits are contingent on CEOs' cognitive capabilities. In the second essay, I remain focused on the role of CEOs while additionally taking into account a key external stakeholder that helps to determine firms' market value: securities analysts. I argue securities analysts would find it difficult to appreciate and understand ambidextrous

strategies because they tend to think concretely (as opposed to abstractly) when evaluating firms, whereas ambidextrous strategy is better appreciated through an abstract, big-picture lens. Consistent with this idea, I find a (marginally) negative relationship between organizational ambidexterity and analyst stock recommendations. I further propose that CEOs can help address this problem through the ways in which they frame their language toward analysts. In general support of my predictions, I find that the relationship between organizational ambidexterity and analyst recommendations is positively moderated by CEOs' language that is more abstract and reflective of hypothetical distance. These ideas were tested using a combination of computerized text extraction and analysis techniques and panel data regression methods. This dissertation primarily contributes to the organizational ambidexterity literature by suggesting cognitive mechanisms pertaining to CEOs and analysts that help better explain the firm performance effects of simultaneous exploration and exploitation.

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Chapter 1. Introduction to the Two Essays

Distinctions between exploration and exploitation have been used to describe a wide range of firm behaviors and strategies (March, 1991). Exploration allows for better adaptability to changing environments through variance-increasing search efforts and helps enhance the long-term viability of firms. Exploitation, on the other hand helps firms obtain immediate profits from variance-reducing efforts that capitalize on existing products and resources. Exclusive focus on either mode would make firms vulnerable, through maladaptation in the case of extreme exploitation and through failure traps in the case of exclusive exploration (Lavie, Stettner, & Tushman, 2010; Levinthal & March, 1993). As such, simultaneously pursuing these rather different—and in many ways contradictory—organizational strategies is critical for firms to survive and achieve superior performance (O'Reilly & Tushman, 2013). Based on these ideas, prior research has sought to understand how organizational ambidexterity can be achieved and potential solutions including the structural separation of exploration and exploitation across organizational subunits (Benner & Tushman, 2003) and temporal separation across time periods (Boumgarden, Nickerson, & Zenger, 2012), and the nurturing of organizational contexts (systems and cultures) that effectively combines these contradictory activities (Gibson & Birkinshaw, 2004).

The theoretical impetus behind this literature has mainly been the potential benefits of organizational ambidexterity for firms—i.e., better performance and long-term survival. Naturally, there has been a long line of debate in the literature as well as many empirical studies to test this very assertion. Despite several decades of empirical and theoretical research, however, it is still unclear whether there is a positive firm performance effect of organizational ambidexterity. Recent meta analytic evidence suggests the overall effect of simultaneous exploration and exploitation is modest, and that the findings across studies widely vary (Junni, Sarala, Taras, & Tarba, 2013). This suggests that the original ideas behind organizational ambidexterity, which implied generally positive effects for all firms across all situations, needs to be revaluated. There may be previously unconsidered factors which may explain why some firms can benefit from organizational ambidexterity while others find it to be much more difficult.

In this dissertation, I focus on underexplored factors that could influence prior debates on the simultaneous pursuit of exploration and exploitation: the cognitions of important inside actors such as top managers and outside actors such as stock analysts. From a cognitive perspective, simultaneous exploration and exploitation is difficult to pursue, first of all, because exploration involves returns that are less certain, more remote in time, and organizationally distal from the locus of action. There is therefore a tendency for organizational actors to prefer exploitation not least because of the cognitive comfort it provides. In addition, ambidexterity in terms of pursuing exploration and exploitation simultaneously presents further cognitive challenges due to the need to tolerate the contradictions of harboring seemingly incompatible goals and actions (e.g., long-term viability versus short-term profitability, variance increasing versus variance reducing).

I investigate this problem—i.e., the cognitive challenges of combining exploration and exploitation as well as benefiting from it—across two different essays. Beyond pointing out that the cognition of important actors (i.e., CEOs and analysts) could be a potential barrier, I specify the characteristics and mechanisms that would potentially help firms to achieve and reap more benefits from organizational ambidexterity. I highlight the construct of cognitive complexity in the first essay and mechanisms of higher and lower levels of mental construal in the second essay.

1. ESSAY 1

Given what we know through prior research on the influence of top managers and their cognitions, it is possible that the pursuit of organizational ambidexterity could be constrained by the mental capabilities of CEOs. In the first essay, I investigate the cognitive capabilities of CEOs through the construct of *cognitive complexity*, which broadly defined is the ability to differentiate and integrate various mental constructs in the processing of information (Suedfeld & Coren, 1992). Cognitively complex individuals tend to see a nuanced world, consisting of many conceptual categories that are interconnected, as opposed to thinking in black-or-white terms (Larson &

Rowland, 1974). Applied to strategic decision-making, cognitively complexity CEOs would be more willing and better equipped to deal with the contradictions that arise from the simultaneous pursuit of near-term efficiency and longer-tem adaptability. The first question I raise in this essay, therefore, is: *does CEO cognitive complexity help firm become more ambidextrous?*

More importantly, I argue that CEO cognitive complexity also helps to explain why some firms are able to reap more benefits from organizational ambidexterity than others. As mentioned above, a key puzzle in prior research is that the firm performance outcomes of organizational ambidexterity are not as clear as the original theory suggests. A key problem facing ambidextrous firms is the high coordination costs as well as the cost of conflict due to the clear divisions within organizations between those working on existing capability exploration and those responsible for explorative initiatives. CEOs who are cognitively complex would be better able to detect and solve coordination problems due to inconsistencies across explorative and exploitive activities. Cognitive complexity is an individual capacity that would also enable CEOs to reconcile disagreement across organizational coalitions, serving to reduce costs of conflict. Therefore, another key question raised in the first essay is: *does CEO cognitive complexity allows firms to reap more benefits from organizational ambidexterity?*

I further consider the information processing context in which CEOs would operate, to better understand when the effects of CEO cognitive complexity would be bolstered or constrained. As CEOs do not operate in a vacuum and are supported by the inputs of other top management team members, I assert that being surrounded by executives of diverse functional backgrounds accentuates the positive effects of CEO cognitive complexity on organizational ambidexterity. Finally, I also argue that given the cognitive limitations of CEOs, the beneficial effects of CEO cognitive complexity would be attenuated in the presence of product diversification strategies, given that this would serve as a competing information processing demand for CEOs dealing with the challenges of organizational ambidexterity.

2. ESSAY 2

In the second essay, I continue to examine the role of CEOs while introducing another key actor that helps to determine firm performance: securities analysts. My first argument of the essay is that analysts would find it difficult to appreciate ambidextrous strategies due to the way they are incentivized and conditioned to think. Prior research suggests analysts tend to prefer firm strategies that are non-unique and exploitative, as they are mostly concerned about delivering near-term returns for shareholders (in contrast, explorative strategies entail venturing into new unknown areas that are category defying and unique). What is much needed is theory explaining how firms respond and help external audiences such as analysts understand the value of firm strategies that combine exploration and exploitation. Drawing from prior research and through data analyses, I first assert that analysts' evaluations are negatively influenced by organizational ambidexterity. I theorize that part of the problem is that simultaneous exploration and exploitation poses challenges for analysts in terms of their incentives and cognitive frames.

The main assertions I make in this essay is that CEOs can use language to shift analysts' cognitive frames, which in turn would affect analysts' evaluations of the firm. To further elucidate the cognition-shifting efforts by executives, I draw from impression management and construal level theory. I focus on conference calls between managers and analysts as a stage on which CEOs' could influence analysts' impressions and understanding of firms' strategies. I predict that CEOs can use language that reflects higher levels of construal (i.e., emphasis on the big picture) in order to mitigate the negative influence of organizational ambidexterity on analyst evaluations. Specifically, I assert that CEOs' language that reflects greater temporal distance (e.g., they talk more about the future than the past), hypothetical distance (they talk about possible outcomes rather than certain ones), and is more abstract (reflected in the use of more adjectives rather than verbs) helps analysts to shift their mental frames to a state that would allow them to better understand the value of ambidextrous strategies.

3. DATA AND METHODS

While I provide detailed descriptions of my methods in the following chapters, I wish to highlight some data and methods that are unique to this dissertation. Particularly worth noting is the use of computerized textual analysis to measure the key constructs. I make use of massive amounts of CEOs' utterances in earnings calls to measure cognitive complexity. Given the large numbers of transcripts that served as the raw data for this part of the analysis, I relied on a personally written Python program to extract the relevant data. These utterances were then analyzed using the Linguistic Inquiry and Word Count (LIWC) dictionary to derive cognitive complexity scores for each CEO. To establish the validity of this measurement, I conducted a study using a sample of MBA students' written assignments and their paper-and-pencil tests of cognitive complexity. I also assessed the reliability of this text-based measurement over time and across different firms. Further details of these analyses are reported in the next chapter.

The language CEOs use to converse with analysts in conference calls, which comprise the moderators in the second essay, were also measured using computerized text analysis. It is noteworthy that I used the LIWC dictionary as well as computerized Natural Language Processing (NLP) techniques to measure the indicators of high construal level (i.e., big picture) language. To measure verbal abstractness, I used Python to perform part-of-speech tagging to identify and count the frequency of different types of verbs, adjectives, and nouns in earnings call transcripts. These counts of parts of speech were then used to calculate a score of verbal abstractness (as opposed to concreteness) based on the Linguistic Category Model (LCM) (Semin & Fiedler, 1991; Semin, Görts, Nandram, & Semin-Goossens, 2002).

In addition to using computerized text analysis, I also relied on archival data sources to measure key variables of interest that pertain to firms, CEOs, and analysts. I relied mainly on Generalized Estimating Equations (GEEs) to test the predictions in the first essay, and I primarily used fixed effects panel regression models to investigate ideas in the second essay.

4. EXPECTED CONTRIBUTIONS

The main contribution of this dissertation is toward research on organizational ambidexterity, a literature that has been built on the idea that simultaneous pursuit of exploration and exploitation is necessary and important, as it helps firms prosper and survive in the long-run. Despite this broad theoretical claim, research across several decades has mostly produced mixed findings (Lavie et al., 2010), and there is considerable variance across studies, samples, and contexts that is yet to be accounted for (Junni et al., 2013). Therefore, across two essays, I argue that the firm performance effects of organizational ambidexterity can be better explained by taking into consideration cognitions of CEOs who occupy key strategic leadership roles and analysts who play an important evaluation role that can drive performance outcomes.

Along these lines, the expected contribution of the first essay would be that CEO cognitive complexity helps to explain why ambidexterity does not always lead to firm performance benefits. My measures show that CEOs vary widely in their cognitive complexity, and as hypothesized, I find that CEO cognitive complexity is a positive moderator of the relationship between organizational ambidexterity and firm performance (both accounting- and market-based). The moderating effect is such that organizational ambidexterity has a positive effect on firm performance, if the CEO has high cognitive complexity. Conversely, organizational ambidexterity was found to hurt firm performance when the CEO has low cognitive complexity. This finding helps to explain why findings in the past have been so highly mixed—organizational ambidexterity could be either performance enhancing or performance reducing depending on whether there is a CEO in charge who has the proper cognitive style and capabilities to deal with the associated challenges.

The second essay also points to an important and previously underexplored barrier to firms' achievement of an ambidexterity-based performance advantage: the difficulty analysts face in properly and favorably evaluating ambidextrous strategies. Consistent with the view that analysts are generally short-term oriented, quantitatively-minded, and narrowly focused, I find (marginal) support for a negative influence of organizational ambidexterity on analyst evaluations. I also find that this analyst evaluation discount, which potentially could lead to lowered firm market performance, can be mitigated through the language CEOs used in their communications with analysts. By using language that focuses on the big-picture, especially words that are more abstract and focused on describing hypothetical states rather than known certainties, CEOs are able to mitigate the negative influence of organizational ambidexterity on analyst evaluations.

In the following chapters, I will discuss in greater details the contributions behind each of the essays. I will first begin with the first essay and present the theory, methods, and the associated findings. In the subsequent chapter I will present the second essay in similar fashion.

Chapter 2. Juggling Act: CEO Cognitive Complexity and Organizational Ambidexterity

1. INTRODUCTION

Simultaneous exploration and exploitation is challenging. It requires managing conflicting routines, resources, structures, and dealing with internal conflict and paradoxical paradigms (Lavie et al., 2010). As a solution to help resolve these tensions, prior research has focused on mechanisms of structural separation (across organizational units and domains of activity), temporal separation, and creating organizational contexts (e.g., systems and cultures) that support ambidexterity (Raisch & Birkinshaw, 2008). Even with these arrangements, however, there are remaining complications. Regarding structural separation, critics have pointed out that the exploration and exploitation activities differentiated across units should eventually be integrated for firms to create value (Raisch, Birkinshaw, Probst, & Tushman, 2009). To this point, researchers have pointed to the critical role of senior leaders in integrating and coordinating across differentiated units (O'Reilly & Tushman, 2008). Furthermore, researchers have also acknowledged the important role of leadership from top managers in creating and managing ambidextrous organizational contexts within a business unit (Gibson & Birkinshaw, 2004). Therefore, there should be greater consideration of the integrative role of top managers as they deal with the challenges of organizational ambidexterity (Calori, Johnson, & Sarnin, 1994; O'Reilly & Tushman, 2013).

In particular, organizational ambidexterity would present several cognitive challenges to top managers. First of all, it requires executives to overcome a tendency toward myopic thinking. One of the primary impediments to achieving ambidexterity is the vulnerability of exploration and the self-reinforcement of exploitation, driven by tendencies towards local search and positive feedback loops (Levinthal & March, 1993). Furthermore, ambidexterity requires overcoming preferences for cognitive consistency (Festinger, 1957). Strategic decision-making in ambidextrous firms is inherently contradictory as it involves juggling explorative strategic logics of discovery, experimentation, and innovation and exploitative strategic logics of certainty, control, and productivity (O'Reilly & Tushman, 2008). As such, prior research emphasizes the importance of embracing the ‘paradox’ of organizational ambidexterity rather than trying to avoid or remove the inconsistencies (Andriopoulos & Lewis, 2009; Smith & Tushman, 2005). Yet, the discomfort of holding conflicting thoughts is challenging to overcome.

This essay focuses on CEOs’ cognitive complexity, which is defined as the degree to which individuals differentiate and integrate in their information processing (Suedfeld, Tetlock, & Streufert, 1992). I argue that cognitive complexity is an important managerial characteristic that explains how some firms are better able to deal with the challenges of ambidexterity than others. Complex thinking entails perceiving nuance in the world rather than seeing it in black-or-white terms (the latter is a symptom of deficient complexity in thought). It leads to decision-making that frequently seeks new disconfirming information, and seeks to embrace seemingly contradictory ideas rather than seeking to remove inconsistencies. As such, cognitively complex CEOs would be capable of dealing with the ostensible contradictions between exploration and exploitation and thus give rise to greater ambidexterity. That is, the first main idea of this study is that *CEOs’ cognitive complexity can help explain why some firms more ambidextrous than others*.

Furthermore, CEOs’ cognitive complexity could also help explain why some firms are able to benefit from ambidexterity while others cannot. Despite the potential benefits of organizational ambidexterity (i.e., simultaneous improvement of short-term efficiency and long-term adaptability), firms may not realize the full potential of this strategy due to the costs of coordination and integration. Cognitive complexity will help CEOs manage some of these costs by enabling the reconciliation of simultaneous bottom-up and top-down information flows and potential conflicts between exploration versus exploitation-minded organizational units and its members. Therefore, the second main idea of this paper is that *CEO cognitive complexity also helps explain why there are varying firm performance effects of ambidexterity across firms*.

This study also considers boundary conditions of the influence of CEOs’ cognitive complexity based on the context in which CEOs process information. I argue that the effects of CEOs’ cognitive complexity would be amplified when CEOs are supported by functionally heterogeneous top management teams (TMTs). In addition, I argue that the effects of CEOs’ cognitive complexity would be weakened in the presence of competing information processing demands, specifically due to higher levels of product diversification.

A unique feature of this study is the measurement of CEOs' cognitive complexity through computerized text-analysis of executives' utterances. I focused my text analyses specifically on the Q&A session of earnings call transcripts, because it allows the capturing of CEOs' unscripted and spontaneous responses toward analyst questions. Using this data, I measure CEOs' cognitive complexity using relevant word categories in the Linguistic Inquiry and Word Count (LIWC) dictionary developed by psychologists (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). Using a sample of MBA students, I test for the agreement between text-analytical measurement against a known paper-and-pencil questionnaire of cognitive complexity (Crockett, 1965; O'Keefe & Sypher, 1981)—the test results indicate acceptable levels of construct validity. I also evaluate the consistency of the text-analytical measure of cognitive complexity within CEOs across different firms. I find high levels of stability, indicating that CEO cognitive complexity is operating at the CEO level rather than firm level, and that it is a relatively stable individual trait.

This paper primarily contributes to the organizational ambidexterity literature, and the debate on the extent to which ambidexterity is achievable and how it impacts firm performance. On one side of the debate is the combining view of ambidexterity, which argues that exploration and exploitation constitute separate activities that potentially complement each other. Thus, it is possible for some firms to exhibit high levels of both exploration and exploitation. In contrast, the balancing perspective contends that there are strong trade-offs between the two modes (i.e., exploration and exploitation each crowd out the other). As a way to reconcile these two views, it is worth noting that the extent to which the trade-offs are manageable (versus insurmountable) depends on resources and capabilities (Cao, Gedajlovic, & Zhang, 2009; Gupta, Smith, & Shalley, 2006), which often can be traced back to managers (O'Reilly & Tushman, 2008), that help firms tackle the challenges of ambidexterity. Consistent with this logic, I argue that cognitive capabilities of CEOs—as reflected in their cognitive complexity—helps explain why some firms are able to manage trade-offs better than others. The theory I propose cautions against extreme versions of orthogonality or trade-offs in the interplay between exploration and exploitation. Instead, I argue that both views should be taken into account: the degree to which the orthogonality condition (versus the trade-off condition) is more representative of reality depends on CEOs' cognitive capability (as reflected in their cognitive complexity) to deal with ambidexterity.

This study also contributes to strategic leadership research (Hambrick, 2007), which has called for more research on executives' thinking styles, i.e., patterns of information processing within an individual's mind, of which cognitive complexity is an important dimension (Finkelstein, Hambrick, & Cannella, 2009). Given the central role that executives' information processing plays in the upper echelons perspective, it is not difficult to understand the theoretical need to uncover executives' thinking styles and how it shapes firm outcomes. What has impeded such inquiry, despite its theoretical appeal, is the difficulty of measuring executives' thinking styles in large-scale fashion. This study demonstrates a way to overcome this measurement challenge by using computerized text-analysis on a massive collection of CEOs' spontaneous responses to questions, and by validating this measurement against an established questionnaire of cognitive complexity. Based on this methodological progress, I contribute to the upper echelons literature theoretically by linking CEOs' cognitive complexity to a range of strategic choices (which are captured in the concepts of exploration and exploitation) and also examining the conditions under which this cognitive trait would have varying influences on firm strategy.

This paper precedes as follows. First, I review the key debates and ideas in prior research on organizational ambidexterity and cognitive complexity. Second, I develop theory that establishes several linkages between CEO cognitive complexity, organizational ambidexterity, and firm performance. Finally, I provide details about the methodology and data, followed by findings and a discussion.

2. RESEARCH ON ORGANIZATIONAL AMBIDEXTERITY

In this section, I review research on the main dependent construct of this essay, organizational ambidexterity. I begin by introducing the theoretical foundations and general definition of the construct based on what is agreed upon in the literature. I then delve into several topics of ongoing debate. These include balancing versus combining views of organizational ambidexterity, the appropriate means of achieving ambidexterity, and firm performance implications. In conducting this review, I take into account multiple theoretical perspectives, levels of analysis, and research designs. I will conclude this section by offering an assessment and critique of the literature.

2.1. What is organizational ambidexterity?

Ambidexterity in the general sense refers to the rare human ability to use both the right and left hand equally well. Applied to organizations, ambidexterity generally refers to the state of tackling two competing sets of activities and concomitant goals at the same time. In one of the earliest uses of the term 'organizational ambidexterity', Duncan (1976) wrote about the competing goals of efficiency and adaptation. Without evoking the term ambidexterity, Miles and Snow contemplated how firms might be able to solve both the entrepreneurship (adaptation) and engineering problem (efficiency) at the same time through strategic configurations such as the 'analyzer' ideal type (Miles, Snow, Meyer, & Coleman, 1978). An ethnographic study by Adler, Goldoftas, and Levine (1999) examined how management systems and culture was used to enable autoworkers in the NUMMI plant to balance efficiency and flexibility. In subsequent years, Tushman and O'Reilly (1996) have focused on the challenges of pursuing both incremental and discontinuous innovation at the same time, for example, through structural separation. The canvassing of the literature shows that there are many more possible sets of dual organizational goals that could be balanced within organizations. As such, what was needed was a theoretically-guided understanding of the goals and activities organizations are striving to balance or achieve simultaneously, and what the key tensions between these opposing goals are.

March (1991) provided such a theoretical anchor point by defining the key tension between two fundamental, yet inherently contradictory, types of learning and organizational activity: exploration and exploitation. Exploration refers to behaviors aimed at creating new knowledge whereas exploitation involves behaviors to refine existing knowledge (Levinthal & March, 1993). Exploration includes behaviors such as variation, risk taking, experimentation, play, flexibility, discovery, and innovation; exploitation entails behaviors including refinement, choice, production, efficiency, selection, implementation, and execution (March, 1991). It should be noted that both exploration and exploitation involve learning. Relevant to this point, March specifically noted that "the essence of exploitation is the refinement and extension of existing competencies, technologies, and paradigms…the essence of exploration is experimentation with new alternatives" (1991: 85). Thus, exploitation does not entail the absence of learning or search, but rather it involves learning and search that is more incremental and local than exploration (Gupta et al., 2006).

Notwithstanding some skeptical views, there is general consensus in the literature that simultaneous exploration and exploitation is desirable, because firms' sustained competitive advantage depends on efficiency as well as adaptability (O'Reilly & Tushman, 2013; Tushman & O'Reilly, 1996). Only focusing on adaptability while overlooking efficiency concerns would threaten the reliability of performance over time, and a narrow focus on efficiency would threaten firms' ability to prosper over the long-term, especially in changing environments (Cao et al., 2009). At the same time, the literature suggests that given resource constraints and potential trade-offs between these two different paradigms, there are significant challenges for firms seeking to achieve and benefit from both at the same time. Therefore, organizational ambidexterity, or *the ability to simultaneously pursue exploration and exploitation*, has been the subject of many debates and investigations during the past few decades: it represents an organizational state that is thought to be desirable but difficult to achieve.

It is worth pointing out that ambidexterity conceptualized in terms of simultaneous exploration and exploitation is also compatible with prior research that examined similar phenomenon using different terminology. Notably, the Miles and Snow typology suggests prospector and defender strategies as two ideal organizational configurations that emphasize, respectively, exploration and exploitation (Miles et al., 1978). In between these two extremes is the analyzer strategy, which seeks to capture the benefits of efficiency while maintaining exploratory flexibility—this strongly resembles the ideal espoused by ambidexterity theorists (Fiss, 2011). Similary, Burgelman's (1991; 2002) internal ecology model of strategy-making distinguishes between autonomous, variance-increasing processes (analogous to exploration) versus induced, variance-reducing processes (analogous to exploitation). Consistent with March's view on ambidexterity, Burgelman (1991) advocates the need to combine both of these strategic processes despite the trade-offs that exist: "[O]rganizations may have to keep both processes in play at all times, even though this means that the organization never completely maximizes its efforts in the current domain" (p. 256). Therefore, using the work of March (1991) as an anchor point brings more conceptual clarity to ambidexterity research while, at the same time, allowing the inclusion of a broad range of activities and prior concepts that can be discussed in terms of exploration, exploitation, and ambidexterity.

2.2. Balancing or Combining? Incorporating different views on the nature of ambidexterity

As noted above, the literature generally agrees that organizational ambidexterity is about the simultaneous pursuit of exploration and exploitation. Furthermore, there is considerable consensus that organizational ambidexterity is challenging as it entails simultaneously pursuing potentially incompatible activities. If there were no frictions or trade-offs between exploration and exploitation, all firms could easily become ambidextrous, reap the potential performance-enhancing benefits, and erode any ambidexterity-based advantages their competitors were enjoying. However, the literature is divided with regards to the extent to which these challenges are manageable. Are exploration and exploitation antithetical to each other or are they orthogonal dimensions?

At one side is the 'balancing' view of ambidexterity which argues that the tradeoffs are insurmountable and therefore that exploration and exploration are fundamentally incompatible with each other (Lavie & Rosenkopf, 2006). Accordingly, exploration and exploitation are seen as two ends of a continuum such that one cannot be increased without decreasing the other. Organizational ambidexterity from this perspective entails balancing between exploration and exploitation rather than achieving high levels of both (Lavie, Kang, & Rosenkopf, 2011). This conception leads to operationalizations of organizational ambidexterity expressed as the absolute difference between the exploration and exploitation variables (Fernhaber & Patel, 2012). On the other side is the 'combining' view which assumes that there is potential complementarity between exploration and exploitation, making it possible for firms to simultaneously pursue both types of activities (Cao et al., 2009). Proponents of this view argue that although tradeoffs do exist between exploration and exploitation, there are advantages firms can gain by combining both activities. For example, firms could deepen their understanding of existing knowledge through exploitation, and this in turn would help firms enhance their absorptive capacity (i.e., the capability to recognize and assimilate new knowledge) that facilitates exploration activities (Cohen & Levinthal, 1990). According to this perspective, organizational ambidexterity is treated as the combination of the orthogonal constructs of exploration and exploitation. Empirically, this conceptualization is most commonly expressed as the multiplication or addition of separate exploration and exploitation variables (Gibson & Birkinshaw, 2004; Lubatkin, Simsek, Ling, & Veiga, 2006).

Recent studies have sought to reconcile this debate by placing more focus on *firms' capacity to bring together exploration and exploitation* rather than choosing one view over the other. Gupta et al. (2006) helped move the literature in this direction by pointing to (1) scope of analysis (i.e., single versus multiple domains) and (2) resource availability as determining the extent to which exploration and exploitation are compatible. According to these authors, a balancing view is more relevant to studies that analyze single businesses or domains whereas the combining view is more applicable when multiple business or domains are considered. For example, there is less inherent tension between exploration and exploitation when these activities can be separated across different domains of activity (e.g., strategic alliances versus new product development; Stettner & Lavie, 2014) and across business units (Markides & Chu, 2008). Relatedly, the availability of resources is another factor when considering the balancing and combining views of ambidexterity. Firms that possess significant organizational slack would be better equipped to pursue organizational ambidexterity that resembles the combining view (i.e., more exploration and more exploitation) when compared to firms with fewer resources (Cao et al., 2009).

In line with these arguments, I contend that both the balancing and combining views of ambidexterity should be acknowledged and reconciled. Whether exploration and exploitation are compatible or antithetical to each other should not be merely assumed. Rather, there is need for better understanding of the capabilities that allow firms to better combine and manage exploration and exploitation activities and avoid costly trade-offs.

In this study, I focus on a particular resource of the firm which could help determine the extent of trade-offs between exploration and exploitation: the cognitive capabilities of top managers. The possibility of ambidexterity is open to many firms, assuming they have at least some threshold level of organizational slack. However, relatively few firms are able to achieve or benefit from ambidexterity due to cognitive limitations of their executives. The CEO, the most influential individual within top management, assumes overall responsibility for firm actions and outcomes, and thus their attention, time, and interest are a valuable and scare resource (Garg, Walters, & Priem, 2003). Furthermore, decision-makers are generally bounded in their cognitive capabilities and rationality (Simon, 1957), and that also would place constraints on the extent to which exploration and exploitation can be simultaneously pursued. Nevertheless, top managerial cognition is not fixed and could vary depending on the characteristics of top managers as a team or as individuals. Therefore, the theory presented later on suggests that CEOs' cognitive capabilities—reflected in the construct of cognitive complexity—help explain why some firms are better able to combine exploration and exploitation and manage the costly trade-offs between these activities.

2.3. Specifying the challenges and tradeoffs in the pursuit of organizational ambidexterity

While I discussed some of the tensions between exploration and exploitation in the above discussions, it is worthwhile discussing these in more detail. Achieving ambidexterity is challenging for several reasons. First, it is *costly to coordinate and integrate* the highly-divergent modes of exploration versus exploitation. These can be thought of as two contrasting paradigms in terms of organizational structure, processes, capabilities, and knowledge flows. Exploration, most likely, would entail focused investments in the variance-increasing areas of R&D, building of absorptive capacity, and development of new technologies, which will allow creation of new knowledge. To support these efforts, the organizational structure would be loosely-coupled and decentralized (Mom, Van Den Bosch, & Volberda, 2007). Concomitantly, knowledge in the organization would mostly flow from the bottom up and top managers would focus on evaluating and ratifying emerging initiatives (Floyd & Lane, 2000). Conversely, exploitation involves variance-reducing efforts, such as capital expenditures to improve the efficiency of the production function and refinement of existing products and services. Organizations pursuing such activities would be characterized by a tightly-coupled and centralized structure, and mostly top-down knowledge flows (Jansen, Van Den Bosch, & Volberda, 2006); top managers would mostly play a planning and directing role. Given the ostensible incompatibility between exploration and exploitation, achieving ambidexterity would require organizational designs, managerial solutions, and resources that could reconcile the tensions between the two modes.

Relatedly, organizational ambidexterity entails greater potential for *conflict* amongst organizational members. It is well noted that diverse interests exist within firms, and this often leads to the formation of coalitions that seek to control the resources and organizational agenda (Gavetti, Levinthal, & Ocasio, 2007). By definition, ambidextrous organizations simultaneously pursue the seemingly incompatible goals of near-term efficiency and longer-term adaptability. It is not surprising, then, that ambidextrous organizations tend to feature salient conflict amongst organizational members and coalitions. Cyert and March (1963) noted that organizations move forward not by resolving these goal- and interest-based conflicts completely, but rather by a process of 'quasi-resolution of conflict'. This involves the coalitions reaching temporary compromises, for example, by setting priorities and tackling goals sequentially or by making tradeoffs between goal dimensions (Gavetti, Greve, Levinthal, & Ocasio, 2012). The 'dominant coalition' or the group of most influential top managers plays a key role in bringing about these quasi-resolutions and brokering between competing interest groups to provide a direction forward for the organization (Pennings & Wezel, 2010).

In addition, a further challenge of the juggling act concerns path dependencies that push firms towards one extreme position or another (Lavie & Rosenkopf, 2006). First of all, there is a tendency for boundedly-rational managers to fall into a *success trap* in which exploitation drives out exploration (Levitt & March, 1988). This happens when firms find initial success with an approach, deem these results good enough (satisficing), and then continue to engage in local search and avoid making significant changes. As this continues, the core competencies become core rigidities and thus their very own success ends up limiting their future growth potential through exploratory activities (Leonard-Barton, 1992). Furthermore, there is also the noted tendency for firms to fall into a failure trap. When initial failure is experienced, firms could seek to engage in further risk-taking as a way to compensate and make up for the dissatisfactory performance (e.g., performance that fails to meet aspiration levels). As this continues, there ends up being very few routines and tightly-linked competencies in place that would help bring stability and reliability to firm activities and outcomes. Given generally myopic tendencies of decision-makers and the vulnerability of exploration due to uncertain and temporally distal effects (March, 1991), a reinforcing cycle of excessive exploitation (i.e., success trap) is more prevalent than overinvestment in exploration (Levinthal & March, 1993).

In sum, ambidexterity is mostly assumed to be beneficial for firms over the long run, but it presents a steep challenge. It requires the coordination and bringing together of two fundamentally different paradigms of organizing and strategizing that are potentially conflicting. To further add to the difficulties, there are path dependent forces in play that are pushing firms towards extreme positions, especially overinvestment in exploitation. While acknowledging these challenges, it is also important to recognize that the tradeoff between exploration and exploitation can be overcome, especially when considering the possibility of separation across multiple businesses and domains. Furthermore, there are other types of arrangements that can be made within single domains and across temporal periods that can help to overcome the challenges of simultaneous exploration and exploitation. I turn to this discussion below.

2.4. Types of ambidexterity: different approaches to tackling the challenges

Given the challenges identified above, much research has focused on the specific mechanisms through which organizations can effectively balance the competing demands between exploration and exploitation. Prior research has suggested different types of ambidexterity.

First of all, ambidexterity could be pursued through structural separation, i.e., the isolation of exploration and exploitation within different subunits of an organization (Tushman & O'Reilly, 1996). Structural separation is premised on the idea that the costs of housing conflicting demands, routines, and resources within one unit is burdensome and that these costs could be mitigated by creating separation. One of the classical examples of structural separation is the creation of an innovation-oriented organizational unit that is largely independent from the rest of the organization (O'Reilly & Tushman, 2011). Similarly, Christenson (1997) argued that disruptive innovations should be pursued in structurally separated business units. It is argued that by isolating this unit from the rest of the organization, members in this subunit can focus on exploration of new ideas without being subject to the immediate efficiency and short-term profitability concerns pervading other parts of the organization. Following similar logic, it has also been suggested that ambidexterity can be achieved through separation between the internal and external domains of the organization (Lavie et al., 2010). That is, instead of creating separate units or department within an organization, it is also possible to compartmentalize exploration activities from exploitation activities, and vice versa, across firm boundaries. For instance, it is possible to focus on obtaining new knowledge through alliances and acquisitions, while focusing on exploiting existing knowledge through internal efforts (Lavie & Rosenkopf, 2006).

There are limits to ambidexterity through structural means. Although these arrangements could reduce the tension between exploration and exploitation within organizational subunits or domains, the problem of coordination and integration still remains (Boumgarden et al., 2012).

Even if a new radical innovation is developed in a subunit isolated from other parts of the organization, there should be a mechanism that allows this new knowledge to be integrated with the exploitation oriented activities of production and distribution. Similarly, even if new knowledge is obtained from outside of a firms' borders (e.g., through acquisitions), it should be shared and integrated with the firm's internal resources and processes for value-creation to occur.

Second, it has also been argued that ambidexterity, to some extent, could be achieved within in a single organizational unit—this approach is known as 'contextual ambidexterity' (Gibson & Birkinshaw, 2004). Instead of focusing on separation across organizational structures, it focuses on organizational members' ability to exercise ambidexterity across all levels of the organization. This is made possible by creating an organizational context, i.e., processes, systems, and beliefs that shape individual behavior (Ghoshal & Bartlett, 1994), that enables individuals to determine themselves how to allocate time between exploration and exploitation activities. In support of this perspective, it has been found that ambidexterity can arise by creating an organizational systems and processes that encourage stretch, discipline, trust, and support (Gibson & Birkinshaw, 2004). Another study found that training and trust between workers and management is an important determinant of contextual ambidexterity (Adler et al., 1999). Recently, human resources systems have also been linked to creation of a context that balances exploration and exploitation (Patel, Messersmith, & Lepak, 2013). As these studies show, this line of thought mostly views business-unit level ambidexterity as the aggregation of individuals' efforts to combine exploration and exploitation.

While this perspective helps to explain how firms can achieve ambidexterity without resorting to structural separation, theories of contextual ambidexterity could be further improved by more explicit consideration of the top management-directed efforts to create ambidexterity-supportive contexts in the first place. Organizational context affects the pattern of behaviors of individuals at all levels of the organization, but it is top managers in the upper echelons of organizations that are the most influential individuals that can shape organizational context through their decisions and actions. Acknowledging the role of strategic leaders, Gibson and

Birkinshaw (2004) noted the “important role played by senior executives in making an organization context effective and developing ambidexterity” (p. 223).

Third, exploration and exploitation separated across time periods (i.e., temporal separation) has been suggested as an ambidexterity-related mechanism. This mechanism has been referred to using different terms such as ‘punctuated equilibrium’ (Gupta et al., 2006) , ‘vacillation’ (Boumgarden et al., 2012), and ‘switching’ (Adler et al., 1999), but they all address a similar idea: exploration and exploitation can be balanced temporally by having the entire organization switch its focus between these two modes over time. This mechanism has parallels with the concept of ‘sequential attention to goals’(Cyert & March, 1963), and it would be preferred when the negative externalities (coordination costs, conflicts) of simultaneous pursuit are too costly (Boumgarden et al., 2012). For example, Burgelman (2002) suggested that while firms generally are focused on exploitation during most times, these periods of equilibrium are punctuated by short surges of exploratory activity. However, there is disagreement in the literature regarding whether this mechanism of temporally-separated balancing should be included as part of the ambidexterity construct. Some articles treat this as a type of structural ambidexterity (Raisch & Birkinshaw, 2008), while others treat it as distinct. For instance, Gupta et al. (2006) clearly differentiated between ambidexterity and temporal vacillation and asserted that these rely on “radically different mechanisms” (p.694). Consistent with separate treatment, in this essay I take ambidexterity to mean structural or contextual arrangements that balance exploration and exploitation *simultaneously*, rather than across different points in time.

2.5. Tests of the ambidexterity hypothesis: Does it improve firm performance?

To recap the above arguments, there is general agreement in the literature that (1) it is desirable to simultaneously achieve near-term efficiency and long-term adaptability, but (2) there are tensions and costly trade-offs involved in this juggling act. The costs would present themselves in the form of increased conflict, increased coordination and integration challenges, and the lack of strategic focus. To help firms overcome these costly tensions, several types of interventions, namely structural and contextual ambidexterity, have been suggested as solutions to the ambidexterity problem. Whether these interventions actually are able to bring about eventual firm performance benefits has been the subject of much debate and empirical analysis.

Proponents of the ‘ambidexterity hypothesis’ have argued that ambidexterity through structural separation or within business units can be achieved, and that these mechanisms help reduce the costly tensions that arise in pursuing balance (He & Wong, 2004). This view recognizes that trade-offs and coordination costs certainly do exist, but it is argued that it is worthwhile to deal with these problems, as the failure to simultaneously pursue exploration and exploitation entails significant hazards. In particular, overemphasis on exploration would leave firms vulnerable to risk of failure to appropriate (Teece, 1986) while excessive exploitation would expose firms to the risk of obsolescence (Tushman & Anderson, 1986). In support of these arguments, studies have shown that there indeed is a positive firm performance effect of simultaneous exploration and exploitation. Whether operationalized in terms of balancing or combining, organizational ambidexterity was positively linked to firm performance in a survey-based study of Chinese firms (Cao et al., 2009). Similarly, another survey-based study provided corroborating evidence that ambidexterity as balancing is positively linked to sales growth (He & Wong, 2004). Based on content analysts of archival data, another study found that balance between exploration and exploitation is positively linked to the firms’ market value, especially when environmental conditions are dynamic (Uotila, Maula, Keil, & Zahra, 2009).

The doubtful view of ambidexterity, on the other hand, contends that despite efforts at intervention, the tensions between exploration and exploitation are insurmountable. When considering simultaneous exploration and exploitation within a single business unit, a prominent counterargument points to the risks of being “stuck in the middle” (Porter, 1980). According to this line of argument, firms run the risk of being mediocre in both by trying to achieve a balance between exploration and exploitation. To avoid this pitfall, proponents of this view argue that firms are better off specializing in either exploration or exploitation. Accordingly, Stettner and Lavie (2014) argued that pursuing ambidexterity within firm boundaries undermines firm performance due to conflicting routines and limited specialization. The doubtful view of ambidexterity is not limited to single business firms. Even when ambidexterity occurs by exploration in one business unit and exploitation in another, there is an eventual need for the challenging step of integrating these activities at the corporate level. Thus, there is a possibility that the costs of coordinating ambidexterity across businesses and domains would diminish firm performance. Consistent with this idea, Fiss (2011) used a sample that includes both single and multiple industry firms and found that firms seeking to combine elements of exploration and exploitation in their strategies suffered in their performance compared to firms pursuing strategies that are predominantly explorative or exploitative.

Regarding this debate, a clear conclusion has yet to be drawn as the empirical evidence, despite decades of research, is decidedly mixed (Raisch & Birkinshaw, 2008). As shown above, some studies report evidence in support of the ambidexterity hypothesis (Cao et al., 2009; He & Wong, 2004; Uotila et al., 2009) while others report evidence to the contrary (Fiss, 2011; Stettner & Lavie, 2014), making it difficult to draw a definitive conclusion. After canvassing the literature, O'Reilly and Tushman (2013) proclaimed that there is a clear pattern of positive firm performance effects of organizational ambidexterity. Conversely, Raisch and Birkinshaw (2008), after reviewing the evidence concluded that "the empirical evidence of the organizational ambidexterity–performance relationship remains limited and mixed" (p.19). An extensive review by Lavie et al. (2010) also concluded that the "evidence is mixed and complex"(p.138).

The following are some reasons why there might be such a high level of empirical inconsistency in this research domain. First, there is considerable heterogeneity in the conceptualization of ambidexterity, as it can exist in different forms at different levels of analysis. Within firm boundaries, ambidexterity can be conceptualized broadly as configurations of multiple organizational elements (Fiss, 2011; Henderson, 2016), or it can be captured more specifically in terms of technological innovation (He & Wong, 2004), new product introductions (Stettner & Lavie, 2014), or manufacturing processes (Adler et al., 1999). Outside of a firm's boundaries, ambidexterity can be conceptualized in terms of the types of acquisitions and alliances pursued

(Lavie & Rosenkopf, 2006; Stettner & Lavie, 2014). Recently, ambidexterity has also been examined at the individual level (Laureiro-Martínez, Brusoni, Canessa, & Zollo, 2015; Mom et al., 2007; Rogan & Mors, 2014). As such, there are multiple structural and decision levels at which ambidexterity could be defined and measured (Gupta et al., 2006). Therefore, it is important to explicitly take into consideration these different types and levels of ambidexterity in conducting and interpreting this research.

Second, there is imbalance in distribution of the types of research methods used to test the ambidexterity hypothesis. A considerable amount of empirical evidence is based on survey methods and computer simulations (Cao et al., 2009; He & Wong, 2004; Lubatkin et al., 2006; Siggelkow & Rivkin, 2005). Yet another group of studies have relied on qualitative methods (i.e., interviewing, coding of documents) to gather evidence (O'Reilly & Tushman, 2011). Surprisingly little evidence has generated from archival data sources. As each of these methods have both strengths and weaknesses (McGrath, 1981), it would benefit the literature as a whole if more triangulation would take place in the form of different methods and more emphasis on underutilized approaches such as analysis of archival data. The advantage of using archival data would be larger and broader samples, across multiple firms and time periods, that would provide better generalizability and more precise estimates of the sequence of relationships. Furthermore, using archival data would help overcome common methods bias that could influence survey-based results or the strong assumptions that may deviate from reality in simulation methods.

Finally, the high level of inconsistency across different contexts and samples indicates the existence of moderating conditions under which the firm performance effects of ambidexterity would vary. Prior research has suggested several moderating effects at multiple levels. At the environmental level one common argument is that the dynamism of the industry positively moderates the ambidexterity-performance relationship (Uotila et al., 2009). That is, in ever-changing technologies and markets, it becomes more important for firms to not just exploit existing competencies but also explore and obtain new knowledge. At the firm level, it has been argued that firms' resource endowments could significantly moderate the ambidexterity-firm performance relationship. It has been asserted that resource-rich firms (or firms with more organizational slack) would be capable of affording simultaneous exploration and exploitation activities and absorbing the coordination costs involved in the juggling act (Venkatraman, Lee, & Iyer, 2005). Surprisingly, there is not much research that considers moderators beyond these basic environmental and firm-level moderators. Additional efforts in this regard are much needed if we are to systematically explain the highly-varying firm performance effects of ambidexterity across studies.

2.6. Assessment and critique

Organizational ambidexterity has been studied for over three decades. As a result, there is general consensus about the definition of the concept, which is rooted in the exploration and exploitation framework by March (1991). It is also generally agreed that trade-offs and tensions exist between exploration and exploitation, and that some firms employ structural and contextual mechanisms to overcome these impediments. Nonetheless, there is still ongoing debate about a fundamental issue: the specific nature of the relationship between exploration and exploitation and the degree to which they are compatible with each other. This disagreement has created significant fragmentation in the literature regarding whether ambidexterity is possible at all and what its firm performance implications are. One of the factors that may help to reconcile this debate is a consideration of firms' resources (Gupta et al., 2006). When resources are more plentiful, firms have greater leeway to engage in both exploration and exploitation simultaneously, whereas resource-poor firms find this to be difficult and are left with no choice but to increase exploration at the expense of exploitation or vice versa.

This line of argument can be extended by considering another type of resource: the cognitive capabilities of top managers. I assert that an overlooked reason why ambidexterity is challenging involves the cognitive strains it places on top managers who are in charge of coordinating and integrating contradictory exploration and exploitation activities. As top managers are generally cognitively limited and few in number, cognitive capabilities in the upper echelons of firms are a scare yet valuable type of resource that could help firms overcome the challenges that impede the simultaneous pursuit of exploration and exploitation. It is possible that having top managers with the ability to process greater amounts of information in more integrative fashion allows firms to better synthesize exploration and exploitation, leading to more complementarity between these two types of activities. This line of thought is carried forward in the following section, which reviews ideas on executive cognition as it applies to ambidexterity.

3. EXECUTIVE COGNITION AND ORGANIZATIONAL AMBIDEXTERITY

For over two decades, there have been many studies on the types of organizational ambidexterity and its influence on firm performance. Existing explanations to these questions have highlighted structural factors in the form of separated subunits and contextual factors involving processes, systems, and routines (Raisch & Birkinshaw, 2008). Separated structure, for example, through the creation of an exploration-oriented subunit, would also provide insulation from contradictory routines and processes within the unit. However, the activities of such subunit would eventually have to be integrated and coordinated with exploitation-oriented routines and processes of the wider organization (O'Reilly & Tushman, 2013). Contextual ambidexterity could also help deal with tensions between conflicting activities at a more micro-level, but these contexts need to be created and maintained through guidance from higher level management (Gibson & Birkinshaw, 2004).

Indeed, in the organizational ambidexterity literature there have been calls for increased consideration of the role of top managers' capabilities in bringing about organizational ambidexterity and allowing firms to benefit from it (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013). Top managers as playing such roles has been recognized by Barnard (1968) who commented that "it is precisely the function of the executive to facilitate the synthesis in concrete action of the contradictory forces, to reconcile the concrete forces, instincts, interests, conditions, positions, and ideals" (p. 21). Organizational structure and context could help firms cope with the contradictions of two different strategic logics (exploration and exploitation), but it cannot substitute for the need to deal with these tensions through the role of top management.

To understand how top managers could play such an integrative role, it is critical to examine their cognition. Top management teams, in essence, can be viewed as information processing units that are subject to the limitations of bounded-rationality. Because it is humanly impossible to collect and processes all available information, decision-makers inevitably have to rely on cognitive simplifications to process information (Simon, 1955). These simplified mental models and cognitive structures shape the way managers select information, frame problems, and search for solutions (Gavetti & Levinthal, 2000; Hambrick & Mason, 1984). Research has indeed shown that executives' cognitive frames and information processing tendencies influence how executives selectively choose and interpret information and make strategic choices (Crossland, Zyung, Hiller, & Hambrick, 2014; Hitt & Tyler, 1991). Studies have also examined the structure of cognition through simulations (Gavetti & Levinthal, 2000), through mapping techniques (Calori et al., 1994), and computerized text-analysis (Cho & Hambrick, 2006).

In this essay, I examine executives' cognitive capabilities and structures through the construct of cognitive complexity, i.e., the extent of differentiation and integration in one's structure of thinking (Suedfeld & Coren, 1992). In the section below, I discuss why organizational ambidexterity would create certain cognitive challenges for strategic decision-makers. Then, I examine the construct of cognitive complexity, and how this particularly could help firms overcome these challenges. Finally, I review some of the correlates of cognitive complexity that are related to strategic decision-making.

3.1. Cognitive challenges of simultaneous exploration and exploitation

Ambidexterity complicates the information processing of strategic decision-makers in several ways. First, organizational ambidexterity requires decision-makers to go against typical myopia in information search. There is a well-noted tendency for decision-makers to engage in simple-minded local search (Cyert & March, 1963), i.e., seeking information in the neighborhood of the current problem and preferring well-known solutions rather than uncertain ones. Given these tendencies, it would be cognitively challenging to engage in exploration, as the results from such activities are uncertain and distant (March, 1991). Relatedly, the tendency to fall back on known solutions contributes to cognitive inertia that further intensifies firms' risk of falling into success traps (Levinthal & March, 1993). Tripsas and Gavetti (2000) suggested that top managers who experienced success under a certain cognitive frame found it difficult to shift this frame in the face of technological changes. Given these general tendencies, maintaining a balance between exploration and exploitation is challenging as the latter is cognitively more comfortable than the former.

Second, organizational ambidexterity challenges decision-makers' bias toward consistency in their information processing (Festinger, 1957). Ambidexterity requires bringing together two seemingly-incompatible dominant logics of strategy (Prahalad & Bettis, 1986): exploration (future-oriented variance-increasing approach) and exploitation logic (near term focused variance-reduction approach). Either of these templates represent internally consistent gestalts striving to reach different goals through different means. As such, it could be cognitively taxing and psychologically uncomfortable for decision-makers to simultaneously embrace these ostensibly incompatible logics (Schad, Lewis, Raisch, & Smith, 2016). The incompatibility of strategic logics would lead to cognitive dissonance, which individuals seek to avoid by selectively ignoring conflicting data (Cooper & Fazio, 1984). The discomfort of holding conflicting cognitions is such that it could lead to suppressing of contradictions even when it reduces utility maximization potential (Bem, 1970; Lewis, 2000). Therefore, top managers could find it more cognitively and psychologically comfortable to pursue a single 'dominant logic' that focuses exclusively on exploration or exploitation (Bettis & Prahalad, 1995), rather than both at the same time.

Finally, ambidexterity would entail more active and controlled information processing efforts from managers (Shiffrin & Schneider, 1977). An exclusively explorative or exploitative strategy is self-reinforcing (March, 1996). The underlying processes and structures are well understood by organizational members and are governed mostly by routines and standard operating procedures rather than by active managerial cognition (Cyert & March, 1963; Gavetti & Levinthal, 2000). As such, there is less need for top managers' intervention to make these self-reinforcing, routine-driven strategies work. In terms of top managers' cognition, exclusive exploration or exploitation could rest on a mostly automated (i.e., less mindful, less attentive) information processing mode (Keltner, Gruenfeld, & Anderson, 2003). Conversely, organizational ambidexterity requires top managers to engage in more active and careful processing of information to reconcile the inconsistencies between two different paradigms. It demands more deliberate consideration of multiple strategic alternatives and trade-offs to prevent firms from routines-based operations that drives them toward overinvestment in exploration or in exploitation.

3.2. TMT behavioral processes and organizational ambidexterity

Recent studies have begun to examine the linkages between TMT information processing, decision-making, and organizational ambidexterity. This literature has provided some insight into the TMT-level processes that could help to overcome the cognitive challenges of organizational ambidexterity. I briefly review some of the key findings from this literature.

There have been generally two approaches to model the influence of TMT processes. The first is to examine TMT integration processes as an antecedent to organizational ambidexterity. In one such study, Lubatkin et al. (2006) found that TMT 'behavioral integration' or the unity of effort and wholeness, has a positive influence on organizational ambidexterity. They specifically identify collaborative behavior and active exchange of information amongst TMT members as manifestations of integrative behaviors. Through active discussion and information-sharing as a group, the tendency for individual decision-makers to overtly seek simplicity and consistency in their thinking could be overcome. Similarly, the richness of communication richness amongst TMT members has also been found to be a precursor of ambidexterity (Cao, Simsek, & Zhang, 2010). In the studies mentioned above, the behavioral patterns were observed through survey-based data collection. Other studies have used TMT background and demographic characteristics to indirectly make inferences about these processes. Focusing on founding teams of entrepreneurial firms, Beckman (2006) found that overlapping prior firm affiliations predicted exploitation while diverse prior firm affiliations predicted higher exploration. Although this study does not provide direct evidence of a link between TMT compositions and ambidexterity, it provides the insight that adding dissimilar executives to TMTs helps firm decision-makers overcome cognitive myopia through the provision of different information and perspectives.

Another approach has been to examine how TMT integration behaviors can help firms that are already ambidextrous (i.e., through structural separation or contextual means) function more effectively. Consistent with this approach, a theory paper by Smith and Tushman (2005) provided a comprehensive model of how top managers could deal with the persistent contradictions of ambidexterity by adopting a 'paradoxical frame' and by encouraging information integration at the team level, for example, through more frequent and high-quality interactions. Through subsequent qualitative case-based theory building it was found that ambidexterity could be better managed when senior managers are explicitly assigned an integrative role and when rhetorical devices are used to emphasize overarching goals (Smith, 2014). An implication of these studies is that framing can help top managers to embrace contradictions and overcome some of their biases toward simple-minded consistency. Furthermore, interaction amongst team members could help decision-makers overcome narrow-mindedness and myopia, and also engage in more controlled information processing. Research taking this approach has been mostly descriptive and qualitative, and these theoretical assertions have yet to be subject to large-sample empirical testing. As such, it is still left an open question whether executives' can reliably mitigate the negative externalities (coordination costs and conflict) of ambidextrous structures and context within firms to eventually improve firm performance.

3.3. Examining executives' structure of thinking through the cognitive complexity construct

As reviewed above, prior research has linked organizational ambidexterity mainly to the information processing behaviors at the TMT level such as information collection, exchange, and integration through discussions as a group. This line of inquiry can be extended by examining the cognitive structures and capabilities of executives. As noted above, understanding executives' cognition, or how their minds work, would potentially be key to understanding how, despite cognitive challenges, top executives could influence organizational ambidexterity and help firms benefit from it. There is robust evidence to suggest that cognitive structure and patterns have salient influences on strategic choices, and ultimately firm performance (Kaplan, 2011), and the study of organizational ambidexterity would benefit from more direct examination of linkages with executive cognition.

In this study, therefore, I examine executives' cognitive style through the construct of cognitive complexity. This is a construct that addresses the 'way in which' executives think, rather than 'what' they think about. In this regard, this approach differs from other studies on managerial attention to specific content domains or cognitive categories such as entrepreneurship, engineering, or technology (Cho & Hambrick, 2006; Eggers & Kaplan, 2009). This cognitive style construct is related to but also distinguishable from prior research that focused on cognitive structure inferred from cognitive maps and schemas (Reger & Huff, 1993). Both cognitive complexity and cognitive maps approaches assume that cognition is structured—i.e., information is systematically arranged, situated, and in executives' minds. However, the cognitive maps approach focuses on structure as it occurs in the moment in a specific context, whereas cognitive complexity is assumed to be a relatively stable individual tendency for processing information. That is, the former is assumed to be a transient state construct while the latter is characterized as an enduring trait (Finkelstein et al., 2009). Individuals' trait-like cognitive styles can be captured by several typologies and constructs (Suedfeld & Tetlock, 2001). Among the several approaches in this domain, cognitive complexity theory is one that has been well-established in psychology and in the applied domains of political science, education, and to a lesser extent thus far, in the field of management.

The foundations of the cognitive complexity construct can be traced back to Kelly's (1955) personal construct theory, which postulates that individuals make sense of the world through a system of mental constructs they develop. Building on this view, cognitive complexity can be defined as the extent which an individual's cognitive style is *differentiated* and *integrated* (Schroder, Driver, & Streufert, 1967; Suedfeld & Coren, 1992). The first cognitive process, differentiation, refers to the extent to which individuals tend to think about a problem in terms of multiple conceptual dimensions and perspectives. The second process, integration, refers to the degree to which individuals consider linkages amongst differentiated conceptual dimensions, such as contemplating how constructs may interact with each or how they might be components of an overarching higher-order construct (Suedfeld & Tetlock, 2001). Differentiation is a necessary but not sufficient condition for integration, as it is not possible to develop many linkages amongst constructs when only few exist in the mental system.

Cognitive complexity is an individual difference construct, meaning that there are fairly stable differences in this characteristic across people. In general, low cognitive complexity individuals tend to carry relatively few conceptual constructs and perspectives in their minds, conceptualize problems in black or white terms, and perceive few linkages amongst perspectives (Suedfeld et al., 1992). For example, in contemplating a particular strategic problem, an individual with low cognitive complexity would think about this issue from a single perspective and may not incorporate other legitimate perspectives (Tetlock, 1981). Conversely, complex thinkers use more conceptual constructs in their information processing, see the world in more nuanced terms, and tend to perceive the constructs and perspectives as interconnected (Larson & Rowland, 1974). For example, in contemplating a strategic issue, individuals with high cognitive complexity would incorporate various viewpoints and utilize advanced rules (e.g., references to trade-offs between alternatives, synthesis of concepts, integration of ideas into higher-order constructs) to compare and contrast these perspectives.

Correlates of cognitive complexity. Prior research has identified several constructs as relatives of cognitive complexity. In terms of relationships with other cognitive traits, individuals with differentiated and integrated cognitive styles are flexible and less dogmatic in their thinking (Streufert & Swezey, 1986; Suedfeld & Tetlock, 2001). In this regard, studies show that simple thinkers tend to be less willing to consider information that conflicts with their existing views. This rigidity in thinking also relates to findings that cognitively simple individuals tend to hold polarized views and opinions whereas complex thinkers tend to hold more moderate positions. This relationship between cognitive complexity and more moderate opinions tends to generalize to various decisions contexts, as this pattern holds whether it concerns attitudes toward other people (O'keefe & Brady, 1980), evaluations about products (Mizerski, 1978), or political views (Tetlock, Hannum, & Micheletti, 1984). Relatedly, cognitive complexity is positively linked to taking the perspective of others (Hale & Delia, 1976). Taken together, the evidence suggests that when individuals' pattern of information processing is multidimensional, open to new information and the views of others, and seeking of linkages across dimensions, they tend to reach conclusions that are less rigid and extreme.

Complex thinkers also tend to have a high tolerance for ambiguity and inconsistency (Peters & Amburgey, 1982; Stoycheva, 2003). Cognitive complexity determines how individuals deal with the uncomfortable feeling of cognitive dissonance that arises when confronted with conflicting information. Low cognitive complexity individuals are intolerant of dissonance that arises in conflicting/paradoxical situations, and accordingly they seek to resolve this discomfort by simplifying and making crude assumptions. Conversely, people with differentiated and integrative thinking patterns tend to reduce dissonance by integrating and at the same time maintaining the seemingly conflicting conceptual constructs.

According to prior research, cognitive complexity is positively and weakly correlated with intelligence (Suedfeld & Tetlock, 2001). Evidence suggests that cognitive complexity is associated with verbal intelligence and the ability to solve problems in novel ways (Suedfeld & Coren, 1992). Although intelligence is considered to be mostly unchanging and inherited, cognitive complexity can be affected through education. Studies show that higher levels of education are positively related with complex thinking styles (Wally & Baum, 1994). In a similar vein, cognitively complex individuals tend to exhibit creativity (Quinn, 1980). Indeed, one of the key ways in which creative ideas are generated is through bringing together seemingly disconnected ideas. It is not surprising, then, that individuals holding a wide range of conceptual constructs in their minds and perceive linkages amongst them would be more likely to engage in creative thinking.

3.4. Cognitive complexity in strategic management research

Some authors have theorized that cognitive complexity is an important lens through which we can better understand the information processing patterns that lead to strategic choices. In one of the earliest theoretical applications of cognitive complexity in strategy research, Hambrick and Finkelstein (1987) argued that executives' cognitive complexity would be positively related to their managerial discretion. This hypothesis was included in their broader model of managerial discretion, but it was not tested empirically. In one of the first empirical studies on executives' cognitive complexity, Hitt and Tyler (1991) similarly conjectured that cognitive complexity would allow executives to perceive and process a greater number of strategic alternatives, and thus have a greater influence on strategic outcomes. No support for this hypothesis was found in their analysis of survey data.

These early studies have characterized cognitive complexity as a mostly positive executive trait, one that helps bolster strategic decision-making through consideration of a broader range of knowledge and more elaborated processing of information. This generally positive view of cognitive complexity has been carried forward in subsequent research. Wally and Baum (1994) found that a factor consisting of cognitive complexity is positively related to decision-speed, because cognitively complex managers are capable of processing large amounts of sophisticated information in short amounts of time. This finding is interesting because it contradicts earlier research suggesting that complex thinkers tend to spend more time collecting and processing information, leading to slower decision-speed. In a study of cognitive complexity as the outcome, Calori et al. (1994) found suggestive evidence (based on a sample of 26 CEOs) that executives' mental maps are more differentiated and integrated in firms with an international geographic scope. This pattern of evidence is consistent with the 'principle of requisite variety', or the idea that to deal with sophisticated environments, managers should develop knowledge structures that are similarly complex (Ashby, 1956; Weick, 1979).

In an investigation of knowledge structures at the TMT-level, McNamara, Luce, and Tompson (2002) predicted that top managers holding more complex conceptions about strategic groups in the industry (in terms of both differentiation and integration) would lead firms to better firm performance. Their arguments were also based on the view of cognitive complexity as a generally positive characteristic that enhances information processing in firms. However, contradictory to their predictions, the findings were mixed: while there was a positive firm performance effect of the integrated mental models, there was a negative firm performance influence of differentiated knowledge structures.

3.5. Assessment and critique

As this literature review indicates, the influence of executives' cognitive complexity on firm strategy is still unclear. Part of the reason for this is the lack of specificity in what strategic actions would be influenced by the cognitive complexity construct. In this study, therefore, I will examine specific strategic actions captured through the framework of organizational exploration, exploitation, and ambidexterity. Another reason for the lack of clarity is the overlooking of cognitive mechanisms through which organizations might give rise to ambidexterity and benefit from it. As organizational ambidexterity presents several cognitive challenges for executives, it is worthwhile to understand the cognitive structures and capabilities that would help them overcome these barriers. This study, therefore, focuses on the construct of cognitive complexity, specifically with regard to CEOs, to bring clarity to the cognitive differentiation and integration processes critical to models of the antecedents of ambidexterity and its consequences.

Consideration of CEO cognitive complexity also helps address some shortcoming raised from within the organizational ambidexterity literature. In research that examines the relationship between organizational ambidexterity and firm performance, there has been considerable inconsistency (Raisch & Birkinshaw, 2008). Consideration of executives' cognition could help to clarify this relationship. Indeed, organizational ambidexterity researchers have called for research that pays closer attention to managerial capabilities in dealing with the contradictions and tradeoffs inherent in simultaneous pursuit of exploration and exploitation (Birkinshaw & Gupta, 2013). By considering CEO cognitive complexity, this study responds to such calls.

In both the organizational ambidexterity and cognitive complexity literatures, studies have relied mainly on small scale, mostly cross-sectional, approaches to data collection. The main reason for this is the difficulties associated with measuring executives' cognitive complexity in large scale fashion. Prior research has thus relied heavily on survey methods or qualitative analyses of executives' mental maps. To overcome the limitations associated with small scale, cross-sectional data analysis, I will use textual analysis techniques to measure CEOs' cognitive complexity in a way that is both reliable and amenable to large-scale, longitudinal data analysis. This approach helps the generalizability of the theory by going beyond small-scale samples of specific industries or types of firms. Details about the textual analyses will be presented in the methods section.

In the following section, I present the theoretical model and predictions regarding the relationship between CEO cognitive complexity, organizational ambidexterity, and firm performance. The hypothesis about the main effects are presented first, followed by hypotheses addressing moderating relationships.

4. THEORY AND HYPOTHESES

4.1. CEOs' cognitive resources and the compatibility between exploration and exploitation

The achievement of organizational ambidexterity depends considerably on the degree to which exploration and exploitation are mutually compatible or antithetical to each other. Two competing views exist regarding this issue. The balancing view contends that exploration and exploitation tend to crowd out each other, such that it is impossible to increase one without decreasing another. This view is rooted in March's argument that exploration and exploitation represent self-reinforcing patterns of behavior (March, 1991). Alternatively, the combining view of ambidexterity suggests that exploration and exploitation are orthogonal to each other (Cao et al., 2009). Both views agree that organizational ambidexterity is challenging, but the balancing view tends to view these obstacles as insurmountable whereas the combining view contends that it is possible to overcome these impediments through managerial effort (Birkinshaw & Gupta, 2013).

Firm resources have been suggested as an important factor that could help reconcile these competing views (Gupta et al., 2006). The trade-offs between exploration and exploitation are more salient in resource-poor firms that would have to decrease investments in one type of activity to increase or maintain commitment to the other (Lubatkin et al., 2006). When resources are abundant, it becomes more feasible to increase investments in exploration and exploitation at the same time. While this resource-based argument has helped reconcile the two different views on ambidexterity, it has been applied mostly to firms' financial or physical assets, which have been proxied by firm size or age (Cao et al., 2009; Lin, Yang, & Demirkan, 2007; Venkatraman, Lee, & Iyer, 2007). To better understand why some firms are able achieve ambidexterity and benefit from it more than others, there is need for better understanding of other types of resources, especially managerial capabilities that help firms to overcome the self-reinforcing tendencies of exploration and exploitation (Birkinshaw & Gupta, 2013).

This paper focuses on another type of resource that would help to determine firms' capability to deal with the challenges of ambidexterity: CEOs' cognitive resources. CEOs are generally the most influential individuals in firms, and they are responsible for key strategic decisions that are the result of various cognitive activities such as collecting, processing, and interpreting information. Given that decision-makers are inherently bounded in their rationality and that multiple agendas compete for CEOs' attention, time, and interest, CEOs' cognition is a scare and valuable resource. However, the cognitive capabilities of CEOs vary, and this would influence the extent to which exploration and exploitation are antithetical to each other or mutually compatible. When equipped with superior cognitive capabilities, CEOs will be better able to deal with the challenges of organizational ambidexterity and allow exploration and exploitation to increase simultaneously. When their cognitive capabilities are lacking, CEOs can be overwhelmed by the trade-offs between exploration and exploitation and not be able to pursue both at the same time.

4.2 Does CEO cognitive complexity help firms achieve ambidexterity?

To examine the role of CEOs' cognitive resources on organizational ambidexterity, it is important to consider the structure and capacity of cognition that these influential individuals draw from to processes and interpret information (Finkelstein et al., 2009). I assert that important aspects of these cognitive structures and capabilities and can be understood through the construct of cognitive complexity. CEOs are more cognitively complex if their thinking exhibits more differentiation and integration (Suedfeld & Coren, 1992; Weick & Bougon, 1986). Differentiated information processing for CEOs entails bringing to bear a greater number of dimensions in thinking about strategic problems. More integration entails a cognitive structure that features a greater number of interconnections amongst dimensions, and these tendencies lead to more careful consideration of trade-offs amongst dimensions or the synthesis of related dimensions into higher-order constructs (Suedfeld & Tetlock, 2001).

To examine the influence of CEO cognitive complexity on organizational ambidexterity, I present a theoretical model that relies on several mechanisms. Figure 1 provides a visual summary. There are specific cognitive challenges that CEOs need to overcome to give rise to organizational ambidexterity: limited range of information search and strong preference for cognitive consistency, and limited attentional resources leading to automated information processing. These cognitive limitations make it difficult for CEOs to simultaneously pursue exploration and exploitation. My first argument, therefore, is that cognitive complexity is a valuable cognitive resource that helps CEOs overcome these challenges and give rise to organizational ambidexterity. It is worth pointing out that this prediction is about the effects of CEO cognitive complexity on organizational ambidexterity, irrespective of firm performance effects. In the later part of the theory, I will hypothesize about firm performance effects separately. For now, I will theorize about the specific (unobserved) mechanisms linking CEO cognitive complexity and organizational ambidexterity.

First, a notable cognitive barrier to achieving organizational ambidexterity is myopic information search. Bounded rationality and local information search are well noted behavioral tendencies of organizational decision-makers (Levinthal & March, 1993; Simon, 1957). While ambidexterity entails simultaneous exploring and exploiting, executives' myopia inhibits ambidexterity by promoting overinvestment in exploitation at the expense of exploration. That is, executives with a narrow search range are more likely to rely on routine-based learning that is generally inertial and in favor of the status quo. Furthermore, executives' myopia increases firms' susceptibility to success traps in which the short-term benefits of exploitation reinforces organizational preference for short-term strategic investments (Cyert & Williams, 1993). Indeed, a major threat to ambidexterity is the vulnerability of exploration, as it requires actively seeking future opportunities that are distant from current competencies (March, 1991). Executives' myopia, as such, serves as an obstacle to ambidexterity, especially in the non-cognitively complex, as it promotes the crowding out of exploration.

CEO's cognitive complexity counteracts tendencies toward narrow information search. As opposed to simpler thinkers, cognitively complex decision-makers tend to approach strategic problems in a multidimensional and nuanced way (Suedfeld & Tetlock, 2001). A broader range of perspectives, strategic options, and decision criteria are considered in making a decision, as cognitive complexity increases. As their understanding of the strategic problem and competitive landscape is multi-dimensional and sophisticated, cognitively complex CEOs would be capable of searching for strategic solutions outside of the immediate range of action, including options with unproven long-term potential. Furthermore, complex thinking entails increased capacity to integrate seemingly-disconnected perspectives (Streufert & Swezey, 1986). Thus, cognitively complex CEOs will not only engage in more exploratory initiatives but also find ways to integrate these with existing exploitative activities. Therefore, CEOs' cognitive complexity would help firms counteract tendencies for investment in exploitation at the expense of exploration, and instead allow for simultaneous allocation of resources in both types of activities.

Second, another challenge of organizational ambidexterity is the internal and external pressures for consistency and simplicity. Ambidexterity requires the CEO to simultaneously embrace two ostensibly conflicting strategic logics, without converging on a single dominant logic (Smith, 2014). Organizational ambidexterity entails juggling competing ideas in all aspects of the organization such as that regarding structure (centralized and decentralized), process (variance-increasing and variance-decreasing), and management of knowledge flows (top-down and bottom-up) at the same time (Raisch & Birkinshaw, 2008). To achieve this state, CEOs have to overcome both (a) cognitive dissonance, which is the discomfort that occurs when confronted with inconsistent ideas (Cooper & Fazio, 1984), and (b) cognitive simplification, which are processes that prefer a single dominant logic (Bettis & Prahalad, 1995). Pressures for consistency also come from forces outside of firm boundaries. For example, financial analysts tend to prefer strategies that are simple and easily categorized (Litov, Moreton, & Zenger, 2012; Zuckerman, 1999), while strategy practitioners and consultants tend to prefer strategies that can be broken down into a few central factors (e.g., core competence; Prahalad & Hamel, 1990). Thus, to move firms towards an ambidextrous state, CEOs need the capability or willingness to juggle conflicting strategic logics while not being overwhelmed by internal and external pressures for simplification and logical consistency.

CEO cognitive complexity helps firms offset decision-makers' preference for consistency in their strategic logic (Festinger, 1957; Smith & Lewis, 2011). When faced with cognitive dissonance due to the presence of conflicting ideas about how to organize and strategize, the response could depend on the level of cognitive complexity that the decision-maker holds (Harvey, 1965). A low cognitive complexity CEO, given the weak ability to perceive nuances and connections between exploration and exploitation strategies, would rather seek to avoid or remove cognitive dissonance through focusing on a consistently explorative strategy or exclusively exploitative strategy, but not both simultaneously. Conversely, a CEO with a more complex (differentiated and integrated) style of thinking are capable of 'embracing paradox'—i.e., recognizing and accepting the simultaneous existence of inconsistent forces (Andriopoulos & Lewis, 2009; Smith & Tushman, 2005). Instead of removing contradictions, complex thinkers could find ways to balance and synthesize the inconsistencies between the strategic logics of exploration and exploitation (Fischer, Frey, Peus, & Kastenmüller, 2008).

Third, yet another cognitive challenge to simultaneous exploration and exploitation is CEOs' need to engage in highly-controlled (non-automated) information processing (Shiffrin & Schneider, 1977). Although cognitive resources are limited, ambidexterity requires that decision-makers provide attention to many different aspects of the organization with greater vigilance (Ocasio, 2011). A strategy focused on either explorative or exploitative strategy could rely on the self-reinforcing routine-based learning that requires relatively little mindful attention from executives (Levinthal & Rerup, 2006; Levinthal & March, 1993). Conversely, an ambidextrous strategy requires more controlled information processing by CEOs to concurrently focus attention on both exploration and exploitation-oriented strategic logics, activities, processes, and knowledge flows (Lavie et al., 2010), and to deal with the path-dependent forces that intensify the incompatibility between exploration and exploitation (Lavie & Rosenkopf, 2006; Levinthal & March, 1993).

Cognitive complexity in CEOs allows for more controlled (and less automatic) cognition in their decision-making (Keltner et al., 2003). A complex thinking style entails careful consideration of a broad range of strategic options and the complementarities amongst alternatives. As such, it allows for more mindful information processing that enables CEOs to attend simultaneously to the two different paradigms of strategizing and not be overwhelmed by the inconsistent stimuli. Conversely, CEOs with a simple, undifferentiated and non-integrative thinking style, would be less capable of carefully attending to two considerably different ways of strategizing and organizing at the same time. Cognitive simplicity entails more routinized and less-mindful information processing that leads to the low-heed repetition of prior actions and a bias toward exploitation.

Through the mechanisms suggested above, CEO cognitive complexity would assist firms' ambidexterity. When CEOs are cognitively constrained (i.e., low cognitive complexity) organizational ambidexterity will be reduced, as exploration and exploitation will be antithetical to each other. Conversely, when CEOs' hold greater cognitive capabilities manifested in cognitive complexity, organizational ambidexterity will be increased, and exploration and exploitation can each exist at relatively high levels. Such a state is revealed by considering the multiplicative product of separate measures of exploration and exploitation (Cao et al., 2009), resulting in the following prediction:

H1: CEO cognitive complexity is positively related to organizational ambidexterity, assessed by the product of separate measures of exploration and exploitation.

4.3. Moderators of the relationship between CEO cognitive complexity and organizational ambidexterity

In this section, I consider managerial and organizational factors that could explain the conditions under which the proposed effects of CEO cognitive complexity are strengthened or weakened.

TMT heterogeneity. As CEOs do not operate in a vacuum, it is possible that the differentiation and integration capacity of strategic leadership could be enhanced through other top management team (TMT) members (Carpenter, Geletkanycz, & Sanders, 2004; Wiersema & Bantel, 1992). In particular, TMT functional diversity contributes to increased variety of information and interpretive lenses brought to bear in strategic decision-making (Harrison & Klein, 2007). With increased variety in functional backgrounds (e.g., finance, operations, manufacturing, marketing, etc.) and expertise, the TMT as a whole would become more capable of recognizing different concepts and problems and devising solutions that cut across different functional areas. At the same time, there are also costs associated with increased functional diversity (Carpenter, 2002). As different pieces of conflicting information flow into the organization, more effort is needed to integrate and make sense of these inputs. Furthermore, differences in opinions and perspectives would have to be carefully reconciled for the decision-making body to operate smoothly and avoid task conflict (Bantel & Jackson, 1989).

It is likely that the combination of a cognitively complex CEO and functionally heterogeneous TMT would help accentuate the information differentiation and integration capacity of firms. Simultaneously, the costs of TMT functional diversity would be mitigated in the presence of a CEO that is cognitively complex. It has been found that cognitively complex leaders are able to recognize and reconcile potentially inconsistent information from others (Wong, Ormiston, & Tetlock, 2011). In effect, the positive influence of a CEO's cognitive complexity on organizational ambidexterity would be accentuated by the variety in the (functional) background of executives that he or she is surrounded with. Therefore, I predict the following:

H2: TMT functional heterogeneity positively moderates the relationship between CEO cognitive complexity and organizational ambidexterity.

Product diversification. As hypothesized above, CEO cognitive complexity would lead to organizational ambidexterity through its effects on dealing with critical cognitive barriers relevant to the simultaneous pursuit of exploration and exploitation. As cognitive resources are limited, an organizational context that generates competing information processing demands would attenuate the tendency of CEO cognitive complexity to nurture organizational ambidexterity. While there are a multitude of organizational characteristics that can be considered, firm diversification is worth investigating as it is relevant to understanding information processing demands. There is a small amount of overlap between firm diversification and organizational ambidexterity, as structural separation could occur across businesses in diversified firms. However, the two concepts are sufficiently distinct. Firms are deemed diversified when they operate in more than one industry whereas they are considered ambidextrous when pursuing exploration and exploitation activities at the same time. Structural separation could occur across different industries in a multi-business firm, but it could also occur across subunits within a single business unit.

Product diversification presents a cognitive challenge to cognitively complex CEOs in several ways. First, it would increase the dimensions of information that needs to be considered in decision-making. The greater number of related businesses that a firm operates in, the more products, services, resources, strategies, and environments that the CEO needs to consider and coordinate through their decision-making (Henderson & Fredrickson, 1996). More importantly, cognitively complex CEOs would approach diversification in a way that seeks to integrate this information to form a cohesive strategy (Prahalad & Bettis, 1986). Whether this entails finding revenue enhancing resource complementarities or sharing corporate parent resources to reduce costs, this requires recognizing linkages amongst different businesses and findings ways to integrate them. The more cognitively complex the CEO, the more likely they would take on an active role in coordinating across different businesses and managing resource complementarities (Michel & Hambrick, 1992). That is, CEOs that are cognitively complex are likely to take an integrative approach to managing product diversification as opposed to relying only on financial controls. The latter type of management is generally confined to the oversight and monitoring of mostly-autonomous business units evaluated based on objective financial criteria (Kerr, 1985).

Because of the increased competing information processing demands, product diversification would serve to divert the cognitive resources CEOs could use to address the challenges of organizational ambidexterity. Although cognitive complexity reflects increased capacity to perceive various dimensions and process relevant information, CEOs with this quality would find this capacity strained when simultaneously dealing with the variety of stimuli that firm diversification entails while also processing differentiated information relevant to ambidexterity. Moreover, while complex thinking CEOs would have the capacity to perceive interconnections across different dimensions, their ability to do so is compromised when simultaneously focusing on integration across exploration and exploitation activities while also seeking beneficial cross-business complementarities. Therefore, I predict the following:

H3: Product diversification negatively moderates the relationship between CEO cognitive complexity and organizational ambidexterity.

4.4. Does CEO cognitive complexity help firms benefit from ambidexterity?

The firm performance effects of organizational ambidexterity tend to vary across studies, suggesting there are moderators to this relationship that have yet to be specified (Junni et al., 2013). CEO cognitive complexity could be one of these contingency factors that explains why some firms benefit more from organizational ambidexterity than others. I make such an argument based on several mechanisms which are outlined in Figure 1.

In a more ambidextrous firm, the CEO plays a key role in managing the contradictions between exploration and exploitation (Tushman, Smith, & Binns, 2011). Given the inherent tensions of ambidexterity that remain even after structural and contextual mechanisms of resolution have been adopted, the role of senior leadership is critical to explaining why some firms are able to benefit from ambidexterity more so than others (Birkinshaw & Gupta, 2013; O'Reilly & Tushman, 2011). I argue that cognitive complexity in CEOs is an important contributor to managerial capability that helps with the integration challenges and negative side effects (coordination costs and conflict) that follow from organizational ambidexterity (Boumgarden et al., 2012). Here, I specify specific mechanisms through which CEO cognitive complexity could help firms benefit from organizational ambidexterity.

First, for an ambidextrous firm to work properly, strategy making should occur through information flows in opposite directions, i.e., simultaneously through top-down and bottom-up processes (Mom et al., 2007). Exploitation would be guided through a top-down strategy making process in which senior leaders devise strategic plans and initiatives that are then communicated to middle and operational management. Top-down strategy making is generally bounded by existing cognitive frames and dominant logic of strategic leaders—thus, it tends to be inertial (Burgelman, 1991; Burgelman, 2002). Conversely, exploration would rely on a bottom-up process in which strategic initiatives are generated by lower-management and pushed up through the organization for evaluation and ratification by top management. Bottom-up strategic processes tend to challenge top managers' existing cognitive frames.

CEO cognitive complexity would help ambidextrous firms to better harness both strategic processes and information flows. To benefit from both processes, CEOs would have to differentiate between these two processes and maintain them separately. Given evidence that individuals' cognitive complexity is associated with greater tolerance for inconsistency (Amernic & Beechy, 1984; Peters & Amburgey, 1982), cognitively complex CEOs would be able to cope with the coexistence of different points of view (e.g., top-down processes would favor status quo; bottom-up processes would favor change) put forth by these separate processes. Furthermore, given their capacity to perceive linkages across different perspectives, CEOs with complex thinking styles would facilitate the integration of emergent ideas into existing dominant logic and limit the maladaptive tendencies of cognitive inertia (Wong et al., 2011).

In addition, CEOs in charge of an ambidextrous organization would face the challenge of ongoing conflict among managers within the organization. Although coalition-building based on common interests and goals is common in organizations (Gavetti et al., 2012), such behavior is likely to be even more evident within ambidextrous firms, as they harbor contradictory organizational structures and process. As is often the case, when there is a structural separation between exploration and exploitation activities (e.g., separate unit devoted to exploration) this formal structure could serve as a faultline that separates two factions (Van Knippenberg, Dawson, West, & Homan, 2011). According to qualitative studies, a common dynamic that occurs within such firms is the resistance towards resource allocation to explorative initiatives by those who have a vested-interest in exploitation activities (Burgelman, 2002; O'Reilly & Tushman, 2011).

Resolution of organizational conflict amongst factions is a unique role of the top management team, and particularly the CEO who is given the most managerial discretion. Indeed, the CEO could broker between coalitions to contain conflict and reduce associated costs, and cognitive complexity could be desirable for CEOs serving such functions. Compared to cognitively simple individuals, complex thinkers are more open to input from others, better at taking the perspective of others, and have the capacity to perceive and integrate multiple decision criteria to reach a solution (Wong et al., 2011). The implication of these attributes, according to the negotiations literature, is that cognitively complex CEOs would be capable of reaching integrative solutions (as opposed to distributive bargaining) that are mutually beneficial to the parties involved (Tetlock, 1985; Tibon, 2000). CEOs with simple thinking styles, conversely, would be more likely to engage in bargaining that is distributive (i.e., one party would benefit over the other).

Taken together, CEO cognitive complexity would help explain why some firms tend to benefit more from organizational ambidexterity than others. This CEO-level characteristic would facilitate the integration of top-down and bottom-up knowledge flows and allow for better management of ongoing organizational conflict inherent in simultaneous exploration and exploitation. Thus, I predict the following:

H4: CEO cognitive complexity positively moderates the relationship between organizational ambidexterity and firm performance.

5. METHODS

5.1. Sample and data sources

Sample. To test the proposed hypotheses, I collected a sample of publicly traded firms in high-technology industries (internet, software, and pharmaceuticals; SIC codes 2834, 7370, 7372, 7373) during 2002-2015. These industries were chosen mainly because organizational ambidexterity was measured using text-analysis based on a dictionary of words that are specific to these industries (McKenny, Aguinis, Short, & Anglin, Forthcoming). These industries are also appropriate for an empirical test of CEO-based effects, as they comprise high managerial discretion industries in which CEOs (and their cognitions and decisions) should matter. This sampling led to the capturing of 125 firms and 220 CEOs in the data. The total sample size was 927 firm-year observations.

Quarterly earnings call transcripts. To measure CEO cognitive complexity using text-analysis, I collected transcripts of quarterly earnings calls from the Thomson Street Events database. Earnings calls consist of (1) a management discussion session in the form of a presentation delivered by company representatives such as the CEO or CFO and (2) a Q&A session between executives and participating analysts. I only used the Q&A sessions to measure CEO cognitive complexity because the comments during the management discussion session are typically prepared in advance (Green, Jame, & Lock, 2015; Hollander, Pronk, & Roelofsen, 2010). These transcripts are structured consistently in terms of labels that identify speakers and what they say. Using Python code and regular expressions, I was able to automatically extract all of the CEO utterances in Q&A sessions, which amounted to over 8 million words.

Management Discussion and Analysis (MD&A) sections of 10-K filings. To measure organizational ambidexterity, I used the Management Discussion and Analysis section of firms' 10-K filings. To obtain this data, I first scraped the 10-K filings from the SEC EDGAR website, and then extracted out the MD&A section. This source was chosen because the McKenny et al. (Forthcoming) dictionary of exploration and exploitation words was developed based on language found in these documents.

Other data sources. Data for organizational and industry level variables were obtained from various sources including Compustat, The Corporate Library (GMI index), and Riskmetrics. Data for CEOs and executives were collected from Execucomp, Capital IQ, 10-K filings, proxy statements, and LinkedIn.

5.2. Dependent variables

Organizational ambidexterity. In measuring this variable, I follow studies that recognize exploration and exploitation as separate dimensions of firm activity and learning, rather than as the ends of a single scale (Gibson & Birkinshaw, 2004; Katila & Ahuja, 2002). Specifically, organizational ambidexterity was measured as the *multiplication of separate measures of exploration and exploitation (i.e., exploration X exploitation)*. In this study, I view exploration and exploitation as qualitatively different types of firm behavior that cannot be compared on a common scale. As such, the multiplicative approach is favored over an alternative method which calculates organizational ambidexterity by taking the absolute value of the difference between exploration and exploitation (He & Wong, 2004).

Following prior studies of organizational ambidexterity (Stettner & Lavie, 2014; Uotila et al., 2009), I relied on content analysis to measure exploration and exploitation activities. An advantage of this approach is that it could capture a wide range of firm actions that are not easily measurable using firms' financial data. Furthermore, this text-analytical approach can also help overcome the common-methods and self-report biases that are common in survey-based measurements of organizational ambidexterity. I relied on the Management Discussion and

Analysis (MD&A) section of firms' 10-K filings as the source of text to be analyzed for its content. Using the dictionary developed by McKenny et al. (Forthcoming) and the LIWC software, I calculated the proportion of exploration and exploitation-related words for each firm-year. According to McKenny et al.'s dictionary, firm-level exploration can be identified through words and phrases such as "breakthrough", "experiment", "experimental", "new product", and "new system", and exploitation is indicated by words and phrases such as "existing offering", "existing product", "existing technology", "current products", and "efficiency". The full word list can be found in the Appendix.

Firm performance. I used both market and accounting based measures of firm performance. I used *Tobin's Q* as a measure for market-based firm performance, calculated as the market value of assets (market capitalization of equity + book value of debt) divided by the book value of assets. For accounting-based performance, I used *return on assets* (net income divided by total assets). Both types of measures are considered because they capture different aspects of firms' performance. Market-based measures are forward-looking and indicative of longer-term effects and accounting-based measures are conversely more indicative of the short-term profitability of firm operations.

5.3. Independent variables

CEO cognitive complexity. Following prior work (Pennebaker & King, 1999; Slatcher, Chung, Pennebaker, & Stone, 2007), I measured CEOs' cognitive complexity by using several relevant category of words in the Linguistic Inquiry and Word Count (LIWC) dictionary (Pennebaker et al., 2007). Specifically, a CEO's language indicates cognitive complexity when he or she makes more distinctions, uses more qualifications, and is less likely to group ideas together. Making distinctions and qualifications, which are indicators of cognitive complexity, are captured through the word categories of *exclusive words (e.g., but, without, except)*, *discrepancies (e.g., should, would)*, *tentative words (e.g., maybe, somewhat, pretty)*, and *negations (e.g., cannot, doesn't, neither)*. Grouping together ideas, which indicates cognitive simplicity, is captured with inclusive w*ords (e.g., with, and)*. Following Slatcher et al. (2007), the following formula was used for the calculation of CEOs' cognitive complexity: *proportion of exclusive words + proportion of discrepancies + proportion of tentative words + proportion of negations – proportion of inclusive words*.

The reliability (Cronbach's alpha) across the five word categories used to calculate cognitive complexity was 0.64, which is within the acceptable range for creating composite measures based on word categories (Tausczik & Pennebaker, 2010). Thus, it was justifiable to combine these word categories to create a composite index.

I conducted a validity check of this text-analytic measure of cognitive complexity using a sample of MBA students (n=65) who agreed to participate in my study. First, I administered the Role Category Questionnaire (RCQ) on these students, which is a well-established paper-and-pencil instrument of cognitive complexity originally developed by Crockett (1965) and validated in subsequent studies (de Vries, Walter, Van der Vegt, & Essens, 2014; O'Keefe & Sypher, 1981). Then I obtained, with permission, the written case analyses of these students and calculated a cognitive complexity score for each based on the text-analytic method described above. The correlation between the RCQ and text-analysis measure of cognitive complexity was .39. This is reasonably high for a test of convergent validity using two completely different methods (i.e., text analysis vs. paper-and-pencil questionnaire). This correlation is also comparable to what Gamache, McNamara, Mannor, and Johnson (2015) reported (i.e., r =.41) to establish convergent validity of their text-analytic measure of CEO regulatory focus.

I also conducted an additional test to examine whether my measurement of CEO cognitive complexity is capturing a CEO-level characteristic rather operating at the firm level. For this check, I examined the extent to which the CEO cognitive complexity measure was stable for CEOs even after they became CEOs in different firms. Specifically, I identified individuals who served as CEO in two different firms covered by the Execucomp database. In some cases, CEOs appeared to serve in two different firms when in reality these switches were due to mergers and acquisitions, company name changes, or ticker symbol changes. I examined each case and ruled out these artificial firm switches and only retained actual switches to different firms. This led to the identification of 47 individuals who have served as CEO in two completely different firms. The correlation of CEOs' cognitive complexity prior to the switch and after the switch was .81. This strong association demonstrates that the CEO cognitive complexity measure is most likely capturing a CEO-level characteristic, rather than a firm-level attribute. This result also supports the conceptualization of CEO cognitive complexity as a relatively stable individual trait.

Product diversification. I relied on the entropy measure of total diversification to measure product diversification (Hoskisson & Johnson, 1992; Palepu, 1985). Specifically, total diversification is calculated according to the formula $\sum_i P_{\mathrm{i}} \ln\,(1/P_{\mathrm{i}})$ in which P_i indicates the proportion of firm sales in industry *i* at the four-digit Standard Industrial Classification (SIC) level.

TMT functional heterogeneity. Consistent with prior research, I operationalized the top management team as executives who held the title of senior vice president or above (Hambrick, Humphrey, & Gupta, 2015). Although rare, when less than three executives fit this description, I also included the next level of executives (i.e., vice presidents). Following Cannella, Park, and Lee (2008), the primary functional area for these executives was coded as belonging to one of the following eight categories: production-operations, R&D and engineering, accounting and finance, management and administration, marketing and sales, law, human resources and personnel, and other. Then, the TMT functional heterogeneity score for each firm-year was calculated using Blau's index, calculated as $1 - \sum(P_i)^2$ when P_i is the proportion of group members belonging to the *i*th category, which is appropriate when measuring variety in (categorical) attributes of group members (Harrison & Klein, 2007). This variable was mean-centered prior to inclusion in regression models.

5.4. Control variables

I included several control variables at the CEO, firm, and industry level, and for different time periods. At the CEO level, I included *CEO tenure*, measured as the number of years as CEO in the focal firm, as cognitive complexity could be influenced by familiarity with the problem or topic at hand (Hunsberger, Pratt, & Pancer, 1994). I also accounted for *CEO power*—measured as an index comprising of CEO ownership, CEO duality, and reverse of proportion of outside directors (Krause, Filatotchev, & Bruton, 2016)—to account for the varying degrees of CEO influence. Cognitive complexity is conceptually distinguishable from verbal obfuscation, but there could be some empirical overlap between the two. To account for this possibility, I controlled for the *Fog index* (Bushee, Gow, & Taylor, 2015), which is measured as the addition of average number of words per sentence and proportion of words that are greater than six characters. At the TMT-level, I accounted for *TMT size* (i.e., the number of executives belonging to the top management team) and *TMT tenure heterogeneity*—measured as the coefficient of variation (standard deviation divided by the mean) of TMT members' tenure within the firm (Carpenter & Fredrickson, 2001).

I also included firm-level controls. I controlled for *R&D intensity* (measured as R&D spending divided by sales) and to account for the large amount of missing data I included a *R&D missing* dummy coded as 1 when R&D spending is not reported. It is possible that larger and older firms lean towards more exploitation than exploration, and thus become less ambidextrous, because of the inertia that builds into larger organizational structures and over time. Alternatively, larger firms may have a greater capacity to simultaneous explore and exploit (Cao et al., 2009). I therefore control for *firm size* (measured as the logged number of employees*)* and *firm age* (measured as the years during which a firm was covered by Compustat). As the availability of firm resources influences firms' ability to simultaneously invest in exploration and exploitation activities (Cao et al., 2009), I accounted for financial leverage measured as the *debt-to-equity ratio*, and *sales growth* to capture restricted or abundant resources which can potentially influence the capacity for firms to engage in ambidexterity. I controlled for *blockholding* because the influence of CEOs could vary based on the presence of strong shareholders.

At the industry level, I controlled for *industry dynamism,* calculated as an index of the volatility of industry sales growth following prior research (e.g., Boyd, 1995; Dess & Beard, 1984), and industry dummy variables were included in the models to account for the difference across industries represented in my study. Time period was controlled for with a *year clock* variable that gains the value of 1 for every year that passed after the start of the sample period.

5.5. Analytic approach

Given that the data spans multiple firms and years, it was appropriate to use panel regression techniques to analyze the data. Since the main independent variable, CEO cognitive complexity, is a fairly stable trait, I could not use fixed-effects models, as they only estimate within-firm variance. To account for both within-firm and across-firm variance, I used a generalized estimating equations (GEE) approach, which accounts for the repeated measurements of the same variables across time. I specified an exchangeable correlation structure and Gaussian distribution family in all of the models. The link function was 'log' for models in which the dependent variables were organizational ambidexterity or Tobin's Q, both of which were highly skewed and always took a positive value. I used an 'identity' link function for models predicting ROA, as this variable was not significantly skewed. Robust standard errors were used to conduct a conservative test of hypotheses. All dependent variables were measured one year after the predictors (i.e., t+1).

6. RESULTS

The descriptive statistics and correlations are reported in Table 1. I assessed multicollinearity using condition indices and variance inflation factors (VIF). The only case of problematic collinearity was when year dummies were included in the models. I thus dropped the year dummies and instead chose to include a year clock variable that captures the number of years elapsed since the beginning of the sample period. In the correlation table, it is worthwhile noting that product diversification, which is conceptually distinct from organizational ambidexterity, is very weakly correlated with organizational ambidexterity (r = .01).

Table 2 reports the results from the GEE models predicting organizational ambidexterity (measured at t+1). In hypothesis 1, I predicted that CEO cognitive complexity would be positively related to organizational ambidexterity. Model 1 of Table 2 shows that CEO cognitive complexity has a positive and significant ($b = .037$; $p < .01$) relationship with organizational ambidexterity. This provides support for hypothesis 1.

In hypothesis 2, I predicted that there would be a positive moderating effect of TMT functional heterogeneity on the relationship between CEO cognitive complexity and organizational ambidexterity. In Model 2 of Table 2, I added the term for the interaction between CEO cognitive complexity and TMT functional heterogeneity, and this variable is positive and marginally significant ($b = .281$; $p < .1$). In the final model where both interaction terms are accounted for, this interaction effect is positive and significant ($b = 0.317$; $p < .05$). This finding supports hypothesis 2.

This moderating effect is depicted as a graph presented in Figure 2. As expected, when TMT functional heterogeneity is set at the mean, the slope depicting the relationship between CEO cognitive complexity and organizational ambidexterity is positive. Consistent with a positive moderating effect, this slope becomes more positive when TMT functional heterogeneity takes a high value (1 standard deviation above the mean) and the slope appears to be nearly flat when it takes a low value (1 standard deviation below the mean). In line with Hypothesis 2, the effects of CEO cognitive complexity on organizational ambidexterity are accentuated in the presence of high TMT functional heterogeneity.

In Hypothesis 3, I argued that product diversification would negatively moderate the relationship between CEO cognitive complexity and organizational ambidexterity. Model 3 of Table 2 shows the results when the interaction between CEO cognitive complexity and product diversification is added to the model. The coefficient for the interaction between the two variables is negative and significant ($b = -.133$; $p < .01$) and more importantly this significance is repeated in Model 4 where all of the interaction terms are included ($b = -.16$; $p < .01$). These patterns of findings provide support for hypothesis 3.

The moderating effect of product diversification can also be understood through a graph presented in Figure 3. The effect of CEO cognitive complexity on organizational ambidexterity is increasingly weakened as levels of product diversification increase. The effects are strongest, as indicated by the most positive slope, at low levels of product diversification (1 standard deviation below the mean; most likely, these are single business firms). As diversification increases, the effects of CEO cognitive complexity are weakened, and at high levels of diversification (1 standard deviation above the mean) the slope flattens out considerably.

Table 3 reports results from GEE models predicting firm performance (measured at t+1). It is interesting to note that despite existing theory that suggests organizational ambidexterity is universally good for firm performance, I do not find a strong main effect of organizational ambidexterity on performance. Across all models, the coefficients of organizational ambidexterity are not statistically significant. CEO cognitive complexity also does not have a direct, unconditional effect on firm performance. In hypothesis 4, I predicted that CEO cognitive complexity would positively moderate the relationship between organizational ambidexterity and firm performance. In Model 2 of Table 3, where the dependent variable is Tobin's Q, the coefficient of the interaction between organizational ambidexterity and CEO cognitive complexity is positive and significant ($b = .204$; $p < .01$). Similarly, in Model 4 of the same table, where the dependent variable is Return on Assets, the coefficient of the same interaction term is also positive and significant ($b = .027$; $p < .01$). Across two different firm performance measures, I find consistent and strong support for hypothesis 4.

These interaction effects can be better understood through graphs. Figure 4 presents the graph of how CEO cognitive complexity moderates the relationship between organizational ambidexterity and firm performance, when the dependent variable is Tobin's Q. In this graph, it can be seen that the effect of organizational ambidexterity on firm performance is strengthened as CEO cognitive complexity increases. It is worthwhile pointing out that *at low levels of CEO cognitive complexity (i.e., 1 standard deviation below the mean), there is a significantly negative effect of the firm being ambidextrous*. A post-hoc test shows that this slope for low CEO cognitive complexity is indeed negative and significantly different from zero. At high levels of CEO cognitive complexity (i.e., 1 standard deviation above the mean), the effects of ambidexterity on firm performance are positive and significant (confirmed by a post-hoc test). Figure 5 depicts the interaction effect when the dependent variable is ROA. Consistent with the models predicting Tobin's Q, these graphs also show that the effects of organizational ambidexterity on firm performance are increasingly more positive as CEO cognitive complexity increases.

One potential concern could be that these findings are driven by either organizational exploration or exploitation separately, rather than organizational ambidexterity (which is operationalized as the multiplication of the two). To assess this possibility, I re-estimated the models presented in Table 3 with separate exploration and exploitation variables included as predictors. The results of this robustness check are reported in Table 4. It can be seen in this table that the main conclusions drawn from the prior analysis hold. There is no significant main effect of organizational ambidexterity on firm performance, whether performance is measured as Tobin's Q or ROA. However, when organizational ambidexterity is interacted with CEO cognitive complexity, there is a positive and highly significant effect on both indicators of firm performance (both significant at $p < .01$). Therefore, there is robust support for Hypothesis 4, even when accounting for the effects of separate exploration and exploitation in the GEE models predicting firm performance.

7. DISCUSSION

Despite prominent theory that suggests organizational ambidexterity is beneficial for firms (March, 1991; Tushman & O'Reilly, 1996), empirical evidence accumulated in the past few decades suggests a mixed picture regarding firm performance effects (Junni et al., 2013). While some studies have reported a positive firm performance impact (Cao et al., 2009; He & Wong, 2004), other studies have found that simultaneous exploration and exploitation can actually hurt firms' performance (Atuahene-Gima, 2005; Menguc & Auh, 2008). To make better sense of these findings, there is increased recognition that we need more explicit consideration of *managerial capability to deal with tensions within ambidextrous firms* (Birkinshaw & Gupta, 2013). In particular, such capabilities would manifest in senior managers and particularly CEOs (O'Reilly

& Tushman, 2013; O'Reilly & Tushman, 2008), as they would play a key role in dealing with and integrating inconsistencies that are difficult to reconcile.

To explain why some firms are better able to benefit from ambidexterity than others, I propose that it is important to consider CEOs' cognitive complexity, an individual characteristic that addresses the capacity to integrate and embrace inconsistencies. As predicted, empirical analyses show that the organizational ambidexterity-firm performance relationship becomes stronger as CEO cognitive complexity increases. Unexpectedly, the findings indicate that the moderating role of CEO cognitive complexity is more critical than what has been hypothesized. Not only does CEO cognitive complexity help firms enjoy greater benefits from ambidexterity, it also explains why some firms are actually losing out even though they are ambidextrous. That is, when CEO cognitive complexity is low, being ambidextrous can actually hurt the company. Conversely, firms can benefit from ambidexterity when they have CEOs that are cognitively complex, and thus have the capacity to embrace tensions and resolve conflicts in a more integrative way. Overall, these findings nicely explain—through the lens of CEO cognitive complexity—why some prior studies found negative performance effects of organizational ambidexterity while others have reported positive effects.

In addition to explaining mixed firm performance effects, this study also shows that CEO cognitive complexity helps firms become more ambidextrous in the first place. Becoming ambidextrous is challenging given the tough juggling act that is required of the CEO at the helm of such firms. I find evidence consistent with the idea that cognitive complexity helps CEOs overcome the cognitive challenges of organizational ambidexterity—i.e., the bias toward exploitation due to cognitive myopia and preference for cognitive consistency—and thus better allows firms to achieve ambidexterity. This is in line with the literature that increasingly explores capabilities behind organizational ambidexterity (O'Reilly & Tushman, 2008), and which often points to executives and CEOs as the focal point at which tensions are coordinated and integrated (Smith & Tushman, 2005).

Because CEO cognitive complexity is a limited mental resource, I find that its effects are accentuated or attenuated based on the information processing context that either supports or competes for this resource. I find support for the argument that the impact of CEO cognitive complexity is bolstered by the functional heterogeneity of the top management team, as such diverse teams would bring a wider range of perspectives to the table that would be better comprehended and integrated by a CEO that is cognitively complex. I find support for the idea that product diversification is a competing information processing demand that weakens the CEO cognitive complexity effects, especially since CEO that are cognitively complex would prefer to deal with diversification in more integrative fashion that relies on strategic controls rather than purely financial controls. In addition to what I find in this study, other boundary conditions would likely exist, and that would be an interesting avenue for future research.

This study also contributes to the strategic leadership literature that has called for more research on the cognitive complexity of executives, and how that shapes decisions and firm strategies (Finkelstein et al., 2009). Cognitive complexity constitutes one of the lenses through which to study cognitive styles – or the way in which a person's mind works. While the theoretical relevance of studying executives' cognitive complexity is clear, as it has direct implications for information processing and decision making in the upper echelons, progress has been impeded because large-scale measurement of the cognitive complexity construct is difficult. For example, prior studies on executives' cognitive complexity have relied on surveys, hand-coding, or qualitative methods (Calori et al., 1994; McNamara et al., 2002; Wong et al., 2011), which are useful but limited in conducting large-scale longitudinal studies. Through computerized analysis of texts, specifically transcripts of CEO responses to analyst questions, I was able to overcome measurement issues that have impeded progress in this literature. While this study focuses on the linkages between CEOs' cognitive complexity, organizational ambidexterity, and firm performance, there would be many other strategic concepts and outcomes that could be better understood by examining CEOs' cognitive complexity.

7. 1. Limitations and directions for future research

A potential shortcoming of this study is the use of a sample that only includes firms in high-technology industries. This feature of the sample provides advantages, namely the measurement of organizational ambidexterity using an existing dictionary developed specifically for this industry context (McKenny et al., Forthcoming). However, it may also be argued that the restriction of the sample as such limits the generalizability of the findings to other contexts. Theoretically, organizational ambidexterity should be important in other industries, and not just in high-technology industries. CEO cognitive complexity should also play an important role in other contexts, although its effects might be stronger in high-technology industries due to the relatively high managerial discretion given to CEOs in this industry setting (Chatterjee & Hambrick, 2007). Given this limitation, future studies should find ways to test similar theory in other contexts, not only in terms of different industries but also in different countries as well.

Another limitation is that CEO cognitive complexity, although it is a key cognitive style variable as well as an important psychological trait, is only one possible CEO-level characteristic that may be linked to challenges of organizational ambidexterity. There is potential for additional CEO-level characteristics to explain why some firms are more ambidextrous than others. By the same logic, organizational ambidexterity is only one possible firm-level outcome that may be related to CEOs' cognitive complexity. Given the richness of the construct of cognitive complexity, it is possible that there are other strategy outcomes that may be explained by the presence of CEOs who are able to better differentiate and integrate in their decision-making roles. One possibility that future research could further explore is the connection between CEO cognitive complexity and Corporate Social Responsibility (CSR) and stakeholder management. Firms that attend to the demands of multiple stakeholder groups, which can oftentimes conflict with each other, might benefit from having a CEO that is cognitively better equipped to handle such a role.

Finally, this study is unable to fully mitigate concerns of endogeneity given the use of generalized estimating equations to test the hypotheses. While firm fixed effects would have provided better protection against endogeneity due to omitted variables, it was not possible to use such methods due to the demonstrated stability of CEO cognitive complexity across time, and because this construct is theoretically a fairly stable individual trait. To address this problem, I included a comprehensive set of predictors in the GEE models, including key correlates of CEO cognitive complexity, organizational ambidexterity, and firm performance. Perhaps the most effective way to deal with such problems and get closer to a causal test of the effects of CEO cognitive complexity would be to conduct a laboratory experiment. Although it is a daunting task to conduct experiments with actual firms, it would be possible to test the ideas of this study in a business simulation setting (Hambrick, 2007). For example, whether CEO cognitive complexity actually causes greater levels of organizational ambidexterity (instead of cognitively complex CEOs selecting into ambidextrous firms) could be examined by assigning participants with high levels of cognitive complexity to a CEO role and examining whether organizational ambidexterity (measured through choices made in the business simulation) increases significantly, compared to a control group.

7. 2. Conclusion

Questions central to the organizational ambidexterity literature – how do firms become ambidextrous and how do firms benefit from it—can be better answered by taking into consideration CEOs' cognitive capability to deal with the conflicts and tensions that arise in firms that simultaneously explore and exploit. This study shows that this capability can be captured through CEOs' cognitive complexity. It takes a CEO that is cognitively complex to overcome the challenges of achieving and benefiting from organizational ambidexterity. The most interesting finding of this study, perhaps, is that CEO cognitive complexity helps to explain the mixed firm performance effects of organizational ambidexterity in prior research (Junni et al., 2013; Lavie et al., 2010). The analyses show that in the presence of CEOs with high cognitive complexity, organizational ambidexterity is beneficial for firm performance. However, when CEO cognitive complexity is low, organizational ambidexterity actually has a negative influence on firm performance, measured using accounting and market-based indicators. When the CEO does not possess the cognitive capacity to deal with the contradictions of ambidexterity, pursuing such a strategy could backfire and potentially hurt firms' performance.

Chapter 3. Let's Talk Big Picture: CEO Verbal Abstractness and Analyst Evaluations of Organizational Ambidexterity

1. INTRODUCTION

From the perspective of executives leading publicly-traded firms, making strategic choices to enhance long-term performance often conflicts with preferences of external constituencies such as sell-side securities analysts. Creating sustained value involves exploration, i.e., making risky strategic investments associated with uncertain future returns (March, 1991), and building time and path dependent resources that require patient and consistent streams of investment (Barney, 1991; Dierickx & Cool, 1989). This, however, may be at odds with analysts' preference for immediate and certain gains as reflected in the supreme importance they give to quarterly earnings (Benner & Ranganathan, 2012; Rao & Sivakumar, 1999; Zhang & Gimeno, 2016). Sustained performance also relies on ambidextrous firm strategies that combine the strategic logics of exploration and exploitation to pursue near-term efficiency and long-term adaptation goals simultaneously (Lavie et al., 2010; O'Reilly & Tushman, 2013). Firm outsiders such as analysts, however, may find it difficult to understand and appreciate such strategies due to the perceived contradiction between the two different categories of firm action (Smith & Tushman, 2005).

As sophisticated users of information, analysts ideally should be able to recognize and recommend to investors firms pursuing strategies that are difficult to understand but will eventually create value in the long run (Ramnath, Rock, & Shane, 2008). In fact, the role of analysts as information intermediaries between firms and investors is most needed when firms are pursuing actions that are challenging to decipher—i.e., strategies that are risky, uncertain, forward-looking, and complex (Benner & Zenger, 2016; Feldman, Gilson, & Villalonga, 2014).

However, studies increasingly show that analysts are boundedly-rational information processors whose evaluations of stocks are shaped by their own mental models and calculative frameworks (Beunza & Garud, 2007). Because of this, analysts find it difficult to evaluate firm actions that are non-conforming to the industry categories, technological categories, and strategic categories that they are familiar with. For example, analysts find it costly to evaluate—in terms of effort needed to collect and process information—complex firm strategies that span multiple industry categories and unique strategies that deviate from industry norms (Bhushan, 1989; Zuckerman, 1999). Because analysts face considerable time and cognitive constraints and need to economize on their efforts, they tend to avoid coverage of firms whose strategies are difficult to understand (Litov et al., 2012), and this leads to firms' being discounted in stock markets. To extend our understanding of this problem, more research is needed on whether, and to what extent, analysts are capable of understanding and evaluating firms' different types of strategies (Luo, Wang, Raithel, & Zheng, 2015).

Therefore, the first question asked in this study is: *How does ambidextrous firm strategy influence analysts' evaluations?* Firm exploration is essentially a risky bet on an uncertain future, and it often requires firms venturing outside of their current domains of activity in terms of industry, customers, technologies, business partners, and value-chain functions (Lavie et al., 2010; O'Reilly & Tushman, 2013). Evaluating such strategies thus requires the expansion of one's mental horizons towards the future rather than the present, toward possibilities rather than certainties, and toward spatially remote rather than proximal activities. Drawing from the mechanisms of construal level theory (Trope & Liberman, 2010), this is possible by adopting a mental construal that is abstract (high level) which is associated with perceptions of temporal, spatial, and hypothetical distance towards objects. Furthermore, I propose that ambidextrous firm strategies—which combine the strategic logics of exploration and exploitation (He & Wong, 2004) — are more favorably evaluated from a higher level, more abstract mental construal. When thinking about firms at a high (abstract) level of construal, analysts should be better able to perceive the broader, higher-order categories that integrate the seemingly-contradictory categories of firm actions (Wakslak, Trope, Liberman, & Alony, 2006).

That is, the general idea proposed is that there needs to be fit between construal level required by firm strategy and that used by analysts in their evaluations. Ambidextrous strategies which combine exploration and exploitation are better understood and appreciated when evaluated from a 'big-picture' (high level construal) perception of firms. However, research suggests that analysts generally exhibit a low-level of construal in their evaluation of firms. They tend to attach substantial weight to reported short-term performance (that narrows temporal focus), avoid evaluative uncertainty (that narrows hypothetical distance), and rely heavily on industry-specific knowledge (that restricts spatial horizons) (Benner & Ranganathan, 2012; Brown, Call, Clement, & Sharp, 2015; Rappaport, 2005; Zuckerman, 2000). I argue that such a limited horizon of thought could explain analysts' potential negative reactions to ambidextrous firm strategies that are best understood when adopting (1) a big-picture mental construal that foresees hypothetical outcomes occurring in the future and (2) abstract thinking that conceptualizes firm actions into broad, integrative categories of action (O'Reilly & Tushman, 2013).

From the perspective of firm strategists, it is important to understand what can be done about unfavorable evaluations of ambidextrous strategies due to construal level mismatch. Because analysts are appraising firms as outsiders, they rely heavily on the information provided by firm executives to produce research reports, stock recommendations, and earnings forecasts (Brown et al., 2015). As such, it is possible that analysts' mental representations could shift based the efforts by firm executives. This leads to the second question of this study, which is: *How does CEOs' language in their communications toward analysts influence the latter's evaluations of ambidextrous strategies?*

Micro-level research on mental construal shows that the abstractness of thinking of individuals can be influenced by priming them in laboratories with verbal information that manipulates their perceptions of distance (Trope & Liberman, 2011). For example, by presenting an event as occurring in the distant future, or in a spatially distant location, individuals tend to shift their mental construal to a more higher (abstract) level (Wiesenfeld, Reyt, Brockner, & Trope, forthcoming). I apply such mechanisms to the macro-level context of firm-stakeholder relations. At this level of analysis, studies have shown that firm executives can influence the interpretive frames of analysts and investors through verbal communication (Rhee & Fiss, 2014; Washburn & Bromiley, 2013; Westphal & Graebner, 2010), but notions of distance and abstractness have not yet been considered in these studies of executives' verbal communications. Drawing from these prior works, I argue that CEOs' use of language that is abstract and reflecting of hypothetical distance and temporal distance would trigger a higher level of mental construal by analysts in their evaluations. In turn, this expanded mental horizon would allow analysts to better understand and appreciate ambidextrous firm strategies.

This study contributes to several literatures. First, it helps advance the research on organizational ambidexterity by highlighting an overlooked outcome: analysts' reactions toward firm strategies. In publicly-traded firms, analysts play a key information intermediary role which entails interpreting firms' actions and passing on processed information to investors in the form of research reports and earnings forecasts (Chen & Crossland, 2014; Feldman et al., 2014). Prior research on ambidexterity has mostly focused on the challenges of the interplay between exploration and exploitation from the perspective of internal organizational members (Adler et al., 1999; Lubatkin et al., 2006). However, even after the managerial obstacles to implementing such strategies are cleared, reaching the full potential of ambidexterity is difficult without proper evaluation by analysts (Benner, 2010; Benner & Ranganathan, 2013).

Second, this study also contributes to the literature on managers' influence on analysts. While much research has examined how analysts can shape firms' performance and behaviors, the literature has only recently started to investigate how managers can, in turn, influence analysts and their evaluations (Chen & Crossland, 2014; Westphal & Clement, 2008). This study joins this emerging stream of research by examining executives' verbal communication toward analysts. Given their cognitive limitations and time constraints, analysts cannot attend to all available information when evaluating firms. Instead, analysts would rely on a cognitive frame through which they filter and interpret information to arrive at their own assessments (Beunza & Garud, 2007; Feldman, 2016). To influence the processing and interpretation of information, executives can engage in verbal efforts to help analysts better understand and appreciate their strategies. Specifically, I draw from construal level theory to examine the influence of executives' verbal abstractness (versus concreteness) in their language toward analysts. In doing so, I am able to explain how executives, through these verbal communications, can influence analyst responses toward firms' ambidexterity.

I use quarterly conference call transcripts to examine CEOs' communication toward analysts. This is an excellent setting and data source to test my theory, because what executives say to constituents in conference calls is known to influence analyst evaluations (Brown et al., 2015). Especially since the passing of Regulation Fair Disclosure, there are restrictions against the sharing of private information between executives and analysts (Healy, 2007). Thus, it is likely that executives' communication opportunities such as those provided in conference calls are valuable and much paid attention to by analysts.

In the following section, I will review the prior literature on analyst' reactions to different features of firm strategies and how managers can respond to influence analysts. I then introduce a theoretical model of (1) analysts' challenges in evaluating firms' ambidexterity and (2) how this reaction is moderated by the level of abstractness (construal-level) of executives' verbal communications. Subsequently, I will describe the data and methods used to test this theory, and I will conclude by presenting the findings and discussing its implications as well as opportunities for future research.

2. FIRM STRATEGY AND FINANCIAL ANALYSTS

In recent years, the interplay between firm strategy and analysts has increasingly been studied by strategic management and organizational scholars (Chen & Crossland, 2014; Wiersema & Zhang, 2011). These scholars focus on the function of financial analysts as intermediaries through which information about firms' strategic choices are interpreted, evaluated, and delivered to investors (Benner & Ranganathan, 2013; Ioannou & Serafeim, 2015). Analysts matter to firms because whether well formulated and implemented strategies reach their full potential in the stock market depends considerably on analyst evaluations. By issuing favorable evaluations, analysts can help generate positive stock market reactions towards firm strategies (Luo et al., 2015). In contrast, unfavorable appraisals or dropping of coverage by analysts can lead to firms' strategies being discounted in the stock market (Litov et al., 2012).

Similar to the role of film reviewers or food experts for consumers, analysts function as critics who help investors make decisions by providing useful information and interpretive frames (Feldman et al., 2014; Zuckerman, 1999). Specifically, analysts provide evaluations in the form in earnings forecasts, buy/sell/hold recommendations, and additional qualitative information in research reports. These appraisals do not merely reflect the opinion of the investment community; rather analysts' evaluations tend to guide the stock market by providing information and interpretive frames that help fill the information gap between investors and firms (Beunza & Garud, 2007). Accordingly, a large body of evidence accumulated in the field of financial economics shows that analysts' opinions, recommendations, and forecasts can meaningfully influence investment activity and stock prices (for a review, see Bradshaw, 2011). Analysts are also in a unique position to help reduce the information asymmetry problem as it pertains to firms' value-creating strategies. As critics in other fields do, analysts could help investors understand and make sense of strategies that may seem too unique or complex to comprehend and evaluate (Benner & Zenger, 2016).

In the following review, I will focus on two broad streams in this emerging literature on the relationship between securities analysts and firm strategies. The first broad stream addressess *how firm strategies influence analyst evaluations*. With regard to strategy, the literature has considered different aspects of firm strategy including firm scope (Feldman et al., 2014; Zuckerman, 1999), technological change management (Benner, 2010; Benner & Ranganathan, 2013), and corporate social responsibility (Ioannou & Serafeim, 2015; Luo et al., 2015). Regarding analyst evaluations, it is worth pointing out that I consider two distinctive aspects of analyst appraisals: evaluative favorability and evaluative difficulty. Analysts' evaluative favorability is often captured by more positive stock recommendations (i.e., buy rather than sell) and earnings forecasts (Feldman et al., 2014; Wiersema & Zhang, 2011). Evaluative difficulty is often examined by coverage decisions of analysts. Because analysts are incentivized to cover multiple firms simultaneously (to attract investment banking activities and generate trade volume), they seek to economize on their appraisal efforts (Litov et al., 2012). As a result, firms with strategies that are difficult to analyze (i.e., costly in terms of data collection and processing efforts) tend to be covered less by analysts, and reduced coverage in turn leads to stock price discounts (Zuckerman, 1999, 2000). I will consider both aspects of analylst evaluations in this review.

The second stream of literature I will review focuses on *how managers influence analyst evaluations*. This literature has identified several mechanisms of mangerial influence on analysts which vary in the degree to which they are accomodative of analysts' expectations and preferences. I have categorized these mechanisms intro three types. The first type is 'accommodation through reshaping of firm strategy', which includes actions such as making changes to firm strategic investments in long-term innovation projects (He & Tian, 2013). The second type is 'avoidance through decoupling', which points to superficial policy changes or announcements that seek to create an appearance of addressing analysts' concerns, without addressing them substantively (Westphal & Graebner, 2010). The final type of mechanism, 'influencing through impression management', includes verbal accounts delivered by executives to analysts in an effort to influence analysts' understanding and their opinions about firm actions (Washburn & Bromiley, 2013).

2.1. Research on analyst reactions to firm strategies

There is an emerging stream of research in strategy that seeks to understand how firm strategies influence analysts' evaluations of firms. As a first step to understanding this literature, I will address the role of analysts as information intermediaries that potentially can reduce the information gap between firms and investors regarding firm strategy. Then, I will discuss the specific evaluative outputs created by financial analysts, and the processes underlying such evaluation and its outcomes. After that, I will turn to the main focus of this study and examine the literature that links firms' strategy characteristics with analyst evaluations.

Analysts as information intermediaries. From the perspective of strategy-makers seeking to convince investors that their policy choices are beneficial to shareholder wealth, analysts are important because of their key role as information intermediaries. Few individual investors have the time or skills to accurately determine the worth of publicly-traded firms (Degeorge, Patel, & Zeckhauser, 1999), but they nonetheless continue to face the need to make consequential decisions about whether to sell, buy, or hold their stocks. As such, there is demand for the services of securities analysts, who provide financial information and advice to investors (De Bondt, 1991). Relative to individual investors, financial analysts are considered to be more sophisticated in their analysis of stocks and tend to hold better private information about firms. Accordingly, analysts are able to predict earnings more accurately than mechanistic models that extrapolate from past earnings (Givoly & Lakonishok, 1984). The main task of financial analysts is conducting detailed studies of firms to arrive at evaluations in the form of reports, earnings forecasts, and stock recommendations. In doing so, analysts aim to produce information that is not already common knowledge reflected in firms' stock prices. Research suggests that analysts generally do produce information that is not merely reflecting market sentiment and actually play a key role in shaping investment activity (Bradshaw, 2011).

To produce reports that are useful to investors, sell-side analysts search for information from several sources. Recent analyst surveys reveal that among many data sources, the following are considered the most important. First of all, analysts report that a highly important source of inputs to their evaluations is private communications with management (Brown et al., 2015). This is not surprising, as private correspondence with managers constitutes perhaps the most straightforward means to obtain firm-specific information that is not common knowledge to market participants. Since the implementation of regulation Fair Disclosure (reg FD) in the year 2000, firms listed in the U.S. can be penalized for providing material private information to analysts that would give them an unfair advantage over others (Healy, 2007). In the case that such private information is shared, firms are required to make this information public to other market participants. Even after the implementation of this regulation, direct private contact with management is still an important source of information but it is less likely to lead to the sharing of secretive information that no one else has access to (Brown et al., 2015).

Another high-priority information source for analysts is public conference calls (Brown et al., 2015; Epstein & Palepu, 1999). The most common form of this interaction is the quarterly earnings call, in which analysts receive explanations about the state of firms through a managerial presentation. A subsequent Q&A session is often held to give analysts the opportunity to interact with management and ask questions. Conference calls are open to the public, so the information obtained in these forums is not exclusive to participating analysts. Nevertheless, conference calls are valuable to analysts because of the opportunity to fill their own gaps in understanding by asking questions and receiving more spontaneous, less-scripted information from managers. Consistent with these arguments, analysts who participated and asked questions in conference calls were found to produce more timely and accurate earnings forecasts than analysts who did not participate (Mayew, Sharp, & Venkatachalam, 2009). Furthermore, there is much information that can be gleaned through the subtle cues that managers give off during conference calls. For instance, research shows that the language of executives participating in conferences calls can be used to predict the occurrence of accounting wrongdoing in the form of a financial restatement (Larcker & Zakolyukina, 2012).

Other sources of information used by analysts in their evaluations include publicly-available financial statements, annual reports, reports from the media, press releases from firms, and reports from other analysts (Baldwin & Rice, 1997). Although these sources do not necessarily provide analysts with an advantage over individual investors in terms of informational access, analysts are considered to be superior processors of such information given their expertise in the appraisal of firm value.

Drawing from these various sources of information, analysts produce evaluations of firms in the form of forecasts of the next quarterly earnings, buy/sell/hold recommendations, and comments in analyst reports. Studies have shown that these analyst outputs, indeed, are influential in shaping investment activity (Bradshaw, 2011). For example, it has been found that stock prices of firms that receive high levels of analyst coverage reflect new information more rapidly than firms that receive less coverage (Barth & Hutton, 2000). There is also an accumulation of empirical evidence that stock recommendations and earnings forecasts influence stock prices (Francis & Soffer, 1997; Lys & Sohn, 1990). Therefore, research shows that analysts do matter and the way in which they matter is mainly through their evaluations, which in turn shapes stock investment activity.

However, the literature is not yet in agreement about whether analysts' help reduces the information gap between firms and investors when such an intermediary role is most needed. Arguably, investors need analysts the most when firms engage in patterns of behavior and resource combinations that are unobservable, complex, novel, and distinct from competitors. According to strategic management theories, these are indeed the conditions that would help firms create value in the long-term (Barney & Arikan, 2001; Dierickx & Cool, 1989). At the same time, such characteristics are what makes strategic assessments less intuitive and harder to quantify when compared to assessments of financial and accounting information (Bradshaw, 2011). Therefore, it is important to understand whether, and to what extent, analysts are capable of understanding and evaluating firms' different types of strategies (Luo et al., 2015). In this emerging stream of research, studies suggest that analysts avoid covering firms with strategies that are potentially value-creating but too difficult and costly to analyze in terms of data gathering and processing efforts, analyst time, and attention (Benner & Zenger, 2016; Zuckerman, 1999). The reduced coverage of such firms with difficult-to-analyze strategies eventually leads to a discount of the firm's value in stock markets (Litov et al., 2012). In the following section, I discuss the literature that examines why this may be the case.

The challenges analysts face in evaluating firm strategies. Financial analysts are increasingly being recognized as a key intermediary in strategy research, as they serve as an "information bridge" (Luo et al., 2015 : 133) that links firm strategy with firm stock market value. A paradox that strategy makers face is that firm strategies that create value in the long-run tend to be associated with analysts' evaluative difficulties and large information processing costs (Benner & Zenger, 2016). That is, the potential of value-creating strategies may not be realized in situations where the information bridge does not serve its intended function. Such an assertion can be derived by examining several strands of literature.

First, the resource-based view (RBV) can be used to argue that value-creating firm strategies could be discounted by analysts. A key concept in this perspective is that strategies that lead to a sustained competitive advantage are those that capitalize on firm resources that are not only valuable and rare but also *inimitable* by competitors (Barney, 1991). Inimitability arises in resources and capabilities built through accumulation of knowledge over a long period of time, a path dependent process, the combination of various complementary elements, and causal ambiguity (Dierickx & Cool, 1989; Vermeulen & Barkema, 2002). The RBV also distinguishes between tangible and intangible resources. The latter are generally considered more inimitable, as they are difficult to observe, causally ambiguous, and typically built over time (Mahoney & Pandian, 1992). Interestingly, resources that are too difficult for competitors to comprehend may also be challenging to evaluate from the perspective of boundedly-rational analysts. For example, it would be difficult for analysts to place a value on firms' capabilities such as that concerning innovation, which is built over a long period of time and is not easily observable. Consistent with this argument, Barth, Kasznik, and McNichols (2001) find that analysts' information processing efforts tend to increase as firms obtain greater caches of intangible assets (operationalized as R&D and advertisement spending). Analyst information processing efforts (costs) in this study were measured as the negative of the number of firms followed by a firm's analysts— i.e., if appraising firms required more effort, the firm's analysts covered fewer firms in total.

Second, the exploration and exploitation framework can be used to support the argument that value-creating strategies can be challenging for analysts to evaluate. The main idea of this framework is that exploration (activities that seek new knowledge) and exploitation (activities that refine existing knowledge) constitute two fundamentally different sets of activities that are difficult to integrate (Levinthal & March, 1993). However, this difficult challenge of combining exploration and exploitation is needed for firms to achieve long-term success, which involves appropriating value from existing competencies and acquiring new knowledge to adapt to changing environments (He & Wong, 2004). Part of the difficulty of simultaneous exploration and exploitation, i.e., ambidexterity, is that exploration entails activities such as 'risk-taking, exploration, flexibility, and adaptation' that yield uncertain and distal returns that are difficult for boundedly-rational analysts to understand and support (Lavie et al., 2010; March, 1991). Furthermore, ambidextrous firms combine contradictory firm activities (i.e., exploration and exploitation) that defies simple categorization (Fiss, 2011; Smith & Tushman, 2005). While strategic actions of exploration and exploitation are familiar and can be easily grouped in the minds of analysts, the combination of these actions would be much less familiar and difficult to place under a single category. As analysts tend to economize on their cognitions by placing firm actions within familiar categories, strategies that defy categorization will face an illegitimacy discount (Zuckerman, 1999).

Third, corporate strategy can also be used to further add to this argument. When firms diversify, the strategic logic of firms became multidimensional and complex, and it becomes more challenging to derive a single value of the firm (Duru & Reeb, 2002; Prahalad & Bettis, 1986). The interconnectedness amongst businesses becomes more challenging in the case of related diversification, because expansion into related businesses is often motivated by resource complementarities across businesses (Gary, 2005). When unrelated diversification is pursued, there are less complications for management because the different businesses are operated mostly as separate organizations that are controlled financially by the corporate office (Henderson & Fredrickson, 1996). Analysts would still find it challenging to evaluate such firms, although the cognitive strains may be lesser compared to the case of related diversification.

Corporate strategy is particularly relevant for understanding analysts' evaluations because analysts tend to specialize by industry. In a recent survey of analysts by Brown et al. (2015), it was reported that nearly half of the respondents covered only one industry category such as technology or retail. Furthermore, the same survey also showed that analysts consider their own industry-specific knowledge to be the most important input used to evaluate firms and the most critical determinant of their compensation (Brown et al., 2015). Because this strong emphasis on industry specialization, analysts' knowledge and cognition tends to be bounded by industry (Feldman, 2016). As such, analysts find it challenging to evaluate firms that deviate from known industry categories and/or operate in multiple industries, leading to a valuation discount for such firms (Zuckerman, 1999).

Finally, analysts' evaluative challenges also stem from the pressures by equity investors, who are the users of the information that analysts produce. At the core of such pressures is the agency problem due to investors' delegation of day-to-day firm operations in the hands of managers (Eisenhardt, 1989; Jensen & Meckling, 1976). Because it is difficult to observe with precision how managers behave and because there is an incentive for managers to use organizational resources to promote their own interests, investors tend to disfavor too many resources or too much discretion in the hands of managers (Dharwadkar, George, & Brandes, 2000; Jensen, 1986). To help alleviate these concerns and ensure that management is working towards shareholder wealth maximization, an important function of financial analysts is to serve as corporate watchdogs on behalf of investors (Rao & Sivakumar, 1999). Providing estimates of firms' earnings and stock recommendations on a quarterly basis is part of this role. Absent a method to observe and fully grasp the potential of top managers' strategic efforts and resource allocations, investors prefer to rely on near-term financial measures such as quarterly earnings (Aaker & Jacobson, 1994).

Although short-termism is prevalent in the financial community, there is evidence to suggest that investors who are willing to engage in sophisticated information processing are more patient with their investments. For example, dedicated (as opposed to transient) institutional investors capable of engaging in elaborate analysis are more favorable towards firms' strategic investments in long-term projects (Bushee, 1998; Connelly, Tihanyi, Certo, & Hitt, 2010). Similarly, holders of growth-oriented stocks are more favorable towards risky firm initiatives to navigate technological uncertainty (Benner & Ranganathan, 2013).

Taken together, the literature points to an interesting paradox regarding analysts' evaluations: firm strategies that are value-creating in the long-term can also be difficult for analysts to evaluate (Benner & Zenger, 2016). Specifically, the strategic characteristics of novelty, uniqueness, complexity, and unobservability are the drivers of sustained competitive advantage, but at the same time these characteristics also contribute to evaluative difficulties and increased information processing costs for analysts. These evaluative difficulties are compounded by investors' skepticism toward managerial initiatives that are not immediately observable and measurable.

Empirical evidence. There is an emerging body of literature that empirically investigates the relationship between firm strategy and analysts' evaluations. Among relevant strategy concepts, corporate strategy is the one that has been used the most thus far. One of the earliest of such studies, Bhushan (1989) found that firm diversification had a negative influence on the number of analysts covering a firm. This evidence is consistent with increased information processing costs for analysts evaluating firms with multiple lines of business. Relatedly, Zuckerman (1999) found that firm diversification into multiple industry categories is associated with reduced coverage by analysts, which in turn leads to valuation discounts in stock markets. Litov et al. (2012) expanded the scope of inquiry by also examining how analysts respond to the uniqueness of firm strategy relative to other firms in the same industry. Their results show that analysts' information processing costs increase—i.e., more analyst effort, less analyst coverage—as strategic uniqueness (relative to industry norms) increases. These findings are consistent with the idea that *analysts' attention and knowledge is considerably bounded by their specialization*.

Another set of studies examine the relationship between firm strategies and analysts' responses in the context of technological change. In a study of firms undergoing major technological shifts in the photography and telephone service industry, Benner (2010) found in-depth qualitative evidence that analysts' response to incumbent firms pursuing a new technology is more negative than to firms seeking to extend existing technology. Subsequently, Benner and Ranganathan (2013) found that analysts' evaluations toward firms making strategic investments to adapt to dramatic technological change were contingent on whether firms' investors were growth-oriented or margin-oriented. Specifically, exploration-oriented strategic initiatives to adapt to new technological trends were viewed more unfavorably when a firm's investors were focused on short-term margins. This evidence is consistent with the idea that firm strategies that are explorative (as opposed to exploitive) are difficult for analyst to evaluate because of returns that are uncertain and distal in time and because of potential pressures by short-term oriented investors (Benner & Ranganathan, 2012).

Furthermore, recent studies have investigated the relationship between firm resources and analysts' appraisals. Barth et al. (2001) found that firms' stocks of intangible assets (as indicated by levels of spending in R&D and advertisement) increases analyst' evaluative challenges and information processing costs, as the outcomes from such assets are uncertain and require a longer time to materialize. Consistent with analysts' efforts increasing, this study found that firms' intangible assets are positively related to analyst coverage (because there is more investor demand for understand the uncertain returns from these assets) and negatively related to the average number of firms covered by analysts of the focal firm. Similarly, Barron, Byard, Kile, and Riedl (2002) reported that firms' intangible assets stocks tend to reduce earnings forecast consensus amongst analysts covering a firm. These sets of results, along with the above studies conducted in technological change contexts (Benner, 2010; Benner & Ranganathan, 2013), further substantiate the argument that *analysts' cognitions are challenged when evaluating firms with strategies and resources that are difficult to observe and associated with uncertain and distal outcomes*.

Finally, recent studies have examined the influence of corporate social responsibility (CSR) on analysts' evaluations. Luo et al. (2015) reported qualitative and quantitative evidence suggesting that CSR activities have a positive influence on analysts' evaluations in the form of stock recommendations. Even though CSR initiatives could be costly in the short-term, analysts seem to believe that its long-term benefits—such as improved reputation—are well worth the investment. Ioannou and Serafeim (2015) found that these aforementioned results are contingent on the prevailing institutional logics surrounding the relationship between firms and their stakeholders. Specifically, there was a negative impact of CSR on analyst stock recommendations in the early 1990s, when shareholder-oriented corporate governance prevailed, but these evaluations became progressively more favorable over time with the rise of stakeholder-based governance ideals in subsequent periods (Ioannou & Serafeim, 2015). These studies suggest that analysts' evaluations are critically contingent on their cognitive frames, which are shaped by prevailing societal norms.

Critique of prior literature. The literature has thus far focused on analyst evaluations toward aspects of corporate strategy, firms' technology strategies, and intangible resources. While such research has led to important insights, there are other aspects of firms' strategies that need further investigation. Firm strategy can be conceptualized not only in terms of where to compete (corporate strategy) but also how to compete within an industry (business-level strategy). Furthermore, while it is meaningful to investigate how analysts appraise specific technological strategies and resources, the literature stands to gain from better understanding of how firms' behaviors influence analysts' evaluations. I address these issues by adopting March's exploration-exploitation framework (March, 1991), which allows me to theorize about how two broad types of firm actions and their combination (i.e., ambidexterity) affects analyst evaluations. I will further elaborate on the linkages of this framework with analyst evaluations later on in the theory section.

Furthermore, more research is needed on the cognitive representations that underlie analyst evaluation of firms' strategies. There is considerable consensus in the literature that analysts are boundedly-rational actors that inevitably rely on cognitive frames to filter and interpret vast amounts of information for their evaluation tasks. Studies have shown that cognitive frames analysts use are considerably shaped by categorization and specialization. For example, analysts develop knowledge and ways of thinking based on the specific industry they specialize in (Brown et al., 2015), and this tends to limit their capacity to appraise firms that span multiple industries (Zuckerman, 2000). Analysts' cognitive frames based on industry specialization have also been found to be inertial and not easily changing over time (Feldman, 2016). Analysts also exhibit rigidity in the technological paradigms they have specialized in, leading to a preference for technological strategies that are more familiar (Benner, 2010). While many important insights have been gathered from categorization perspectives, other cognitive mechanisms could also be used to enrich our understanding of analyst evaluations. To add to the literature, I draw from construal level theory (Trope & Liberman, 2010) to theorize about the abstractness (higher-level construal) versus concreteness (lower-level construal) of analysts' mental representations and how that influences their appraisals of explorative, exploitative, and ambidextrous firm strategies.

2.2. Research on managerial efforts to influence analyst evaluations

The research reviewed above shows that financial analysts intermediate between firms and investors, and wield significant influence in determining the worth of firms in equity markets. What is notable from the perspective of firms is that strategies that are potentially value-creating may not realize their full potential in equity markets if analysts are unable to properly understand and evaluate these strategies. Research shows that strategies that are complex, unique, and long-term oriented are devalued by analysts due to their cognitive constraints associated with industry specialization, the unobservability of potentially valuable resources, and investors' skepticism toward long-term projects by managers (Litov et al., 2012; Zuckerman, 1999). The question, then, is how can firm managers influence analysts such that evaluations become more favorable?

A stream of studies has uncovered *response* strategies that differ in terms of the degree to which they are accommodating of analysts' preferences and demands. Borrowing from the framework of Oliver (1991), I will categorize these responses into three types: (1) accommodation through reshaping of firm strategy, (2) avoidance through decoupling, and (3) influencing through impression management. Although these studies exhibit considerable heterogeneity in their theoretical and disciplinary roots, the common thread is that these represent different ways in which analysts' evaluative difficulties due to information asymmetry can be mitigated.

Accommodation through reshaping of firm strategy. One of the ways in which firms can respond to the information asymmetry problem is by reshaping firm strategy such that it is more readily interpretable and understandable for securities analysts. I will focus primarily on the most relevant studies which examined how firm-level strategy is influenced by different forms of analyst evaluations. Secondarily, I will discuss several studies that examined how firm-level strategy is influenced by investors, as their preferences and demands are similar to that of analysts.

As reviewed above, firm diversification is associated with analysts' evaluative challenges because of the increased complexity of the information processing task (i.e., understanding and valuation of multiple businesses and their complementarities) and industry-specific expertise that analysts rely on (Bhushan, 1989; Zuckerman, 1999). Consistent with accommodation of analyst concerns by reshaping strategy, Zuckerman (2000) found that the greater the mismatch of a diversified firm's business composition and the industry specialization of analysts, the more likely that the firm reduces diversification through divestment. Other studies suggest that divestment does indeed have the intended effects of helping analysts overcome their information processing challenges. Specifically, Gilson, Healy, Noe, and Palepu (2001) found that conglomerate breakups have the effect of increasing analysts' coverage and the accuracy of their earnings forecasts, for both the parent and subsidiaries. They also found that forecast accuracy improvement effects were stronger for analysts specializing by industry than those who are generalists, consistent with the idea that divestitures are a valid means for addressing analysts' evaluative challenges due to industry specialization.

Prior research suggests that long-term oriented firm strategies based on exploration of new knowledge and investments in inimitable resources are difficult for analysts to evaluate (Benner & Zenger, 2016). Benner and Ranganathan (2012) examined how firms' strategic investments (R&D activity and capital expenditures) are reshaped as a way to lessen analysts' evaluative challenges. Specifically, they found that firms receiving negative analyst stock recommendations during technological change periods reduced their amount of strategic investments. This can be interpreted as firms reshaping their strategies such that it is more cognitively comfortable for analysts to process because it is more exploitative and focused on near-term efficiency. Consistent evidence was found in other studies in different empirical settings. In a study of a commodity industry, Zhang and Gimeno (2010) reported that increased earnings pressure from analysts (i.e., gap between estimated and actual earnings) triggers competitive behavior that boosts short-term earnings at the expense of long-term benefits.

Reshaping strategy to satisfy the needs of analysts seems like a plausible solution to information asymmetry-based valuation discounts, but some studies point to circumstances under which this approach may not be effective. Consistent with the above studies, Gentry and Shen (2013) also reported that pressures to meet or beat analyst' quarterly earnings forecasts led to reduction of firms' R&D spending. However, the same study also noted that the R&D reducing effects of analyst earnings pressures were attenuated as the collective information processing capabilities of analysts increased (in the form of greater numbers of analysts covering the focal firm). Similarly, there seems to be less need to reshape strategy to accommodate analysts when firms' investors are able to and incentivized to engage in sophisticated information processing. Zhang and Gimeno (2016) found that falling short of analysts' earnings forecasts triggered short-sighted competitive behaviors, but to a lesser degree when firms had more 'dedicated' as opposed to 'transient' institutional investors. It could be inferred that dedicated institutional investors are more capable of analyzing the fundamentals and long-term potential of firms' strategies (Bushee, 1998; Connelly et al., 2010). These findings suggest that when analysts and investors are more capable of comprehending firm behaviors, there would be less need to reshape strategy for accommodation purposes.

Avoidance through decoupling. Instead of reshaping strategy to what is favored by analysts, firms could also choose to create an appearance of accommodation to analysts' and investors' concerns without actually doing so. One instantiation of this mechanism of decoupling is through the adoption of practices that are taken-for-granted as legitimate by the investment community (Westphal & Zajac, 2001). Stock repurchase programs constitute one such practice, and the mere announcement of the espousal to engage in such policies is enough to trigger a positive reaction from the stock market, regardless of whether the practice was actually implemented subsequently (Zajac & Westphal, 2004). Similarly, other studies have shown that the symbolic adoption of firm policies favored by the investment community has similar effects on mollifying investors' concerns about the course of firms' actions (Westphal & Zajac, 1994; Westphal & Zajac, 1998).

More recently, the literature has begun to examine how the mechanism of decoupling is used to mollify analysts' concerns specifically. Benner and Ranganathan (2012), examined how such a mechanism plays out in a sample of firms undergoing technological change, in which analysts' concerns about long-term strategic investments are heightened due to uncertainty. They found that one way for firms to pursue strategic investments that are viewed as illegitimate by analysts is to simultaneously announce stock repurchases—a practice that is generally favored by the investment community (Zajac & Westphal, 2004). Consistent with these findings, firms that are pursing high-levels of R&D activity tend to announce stock repurchase programs as a way to signal their confidence in the long-term potential of these investments and to alleviate investors' concerns of information asymmetry (Sanders & Carpenter, 2003).

Based on a similar decoupling mechanism, Westphal and Graebner (2010) found that analysts' negative evaluations triggered firms to increasingly engage in decoupling with regards to board oversight, specifically by increasing the formal appearance of board independence without actually increasing the power that boards have over management. This was made possible by appointing directors that formally appear to have no contractual ties with top management, when in fact the two parties were connected through informal friendship ties. Furthermore, such decoupling helped alleviate analysts' evaluative pressures when supported by verbal assurances toward analysts about the independence of the board.

Influencing through impression management. Yet another approach to addressing the information asymmetry problem is to provide more information to analysts and investors about firms' strategic choices. Rather than accommodating or placating investors' concerns, it is possible to influence them such that they are better able to understand and evaluate the firm. Impression management theory, which concerns firm actions to influence the perception of a target by regulating and controlling information (Bolino, Kacmar, Turnley, & Gilstrap, 2008; Goffman, 1959; Graffin, Carpenter, & Boivie, 2011), has often been used to explicate these mechanisms.

Since asymmetric information is at the root of problem analysts face in evaluating firm strategies, providing information and assisting in its interpretation could help firms garner favorable appraisals. Although there are several forms of impression management that can be directed toward the investment community (Healy & Palepu, 2001; Washburn & Bromiley, 2013), I will focus on the types of information regulation efforts that focus specifically on analysts as targets: forecast guidance, conference calls, and private interactions.

One form of impression management aimed at influencing analyst evaluations is managers' voluntary forecast guidance. This mechanism is relevant to the current topic because managerial forecast guidance is often issued in response to analyst forecasts. Forecast guidance can be released in various forms, such as a specific point, range, or open-ended estimate of earnings (Cotter, Tuna, & Wysocki, 2006). Although qualitative guidance is also offered by firms, most studies typically focus on quantitative estimates. This quantitative nature of forecast guidance is what distinguishes it from other forms of impression management, which typically is associated with qualitative verbal content (Elsbach, 2003). Most prior work has focused on understanding when and why earnings forecasts are issued (antecedents) and how they subsequently influence analyst and investor behaviors (consequences). Because firm managers are incentivized to make forecasts that are as accurate as possible, they tend to refrain from using this form of impression management when earnings are volatile and thus less predictable (Washburn & Bromiley, 2013; Yhim, Karim, & Rutledge, 2003). With regards to consequences, forecast guidance helps firms build a reputation for transparency and thus lower their litigation risk and cost of capital (Brown, Hillegeist, & Lo, 2005; Leuz & Verrecchia, 2000).

Although research on managerial earnings forecasts has mostly been conducted in the financial economics and accounting fields, recent studies have begun linking this mechanism with organizational and strategic management theories. In one such study, Hayward and Fitza (forthcoming) theorized that offering precise management forecast guidance (i.e., a point estimate rather than a range) would function as a form of impression management that portrays a strong sense of control by top managers. They found evidence that such tactics are more likely to be used after organizational setbacks (e.g., missing earnings guidance in the prior year) that increase the need for top managers to portray that they are in control of the situation. Chen and Crossland (2014) argued that whether earnings forecast guidance by top managers is taken as a credible information asymmetry-reducing signal by analysts depends on managerial discretion (i.e., the extent to which top managers have latitude to influence firm strategy and outcomes; Hambrick, 2007). Consistent with their predictions, they found that managerial forecast guidance had greater influence when industry and firm conditions afforded more discretion to top managers.

Another form of impression management mangers can use to provide information about firms strategy is verbal accounts (Elsbach, 2003). Conference calls are one of the most salient arenas in which top managers can provide verbal information to analysts to influence their evaluations. The most typical conference call is the quarterly earnings call, which usually takes place immediately following the release of financial results and often includes the CEO, CFO, and sometimes other firm executives to discuss the performance and conduct of the company with participating analysts. In most cases, the call consists of a presentation by top executives followed by a Q&A session during which analysts can ask questions. As such, this constitutes a rich interactive setting in which executives can provide new information and influence the interpretation of existing information by analysts and investors. Survey results show that analysts consider conference calls to be a highly important source of inputs for their appraisals (Brown et al., 2015; Epstein & Palepu, 1999). Furthermore, there is evidence that conference calls reduce information asymmetries between firms and investors (Bowen, Davis, & Matsumoto, 2002; Brown, Hillegeist, & Lo, 2004).

Recently, organizational scholars have begun to study conference call interactions from an impression management perspective. Washburn and Bromiley (2013) argued that, among several arenas for impression management, conference calls can be used to provide verbal accounts that seek to justify and minimize perceived negativity by analysts (Elsbach, 2003). Consistent with this view, the authors found that conference calls are more frequently held when firms' earnings fell short of analyst forecasts. Although not conceptualized as a focal construct in their theory, Park and Westphal (2013) also investigated the effects of internal versus external attributions of performance by executives in conference call settings. Influencing behaviors in these settings do not flow in one direction. That is, conference calls also provide an opportunity for analysts to pressure firm executives and ask for clarification on issues. Benner and Ranganathan (2012) reported that analysts, through their questioning, can pressure firm executives to forego strategies that require difficult-to-evaluate investments.

Finally, private interactions should also be mentioned as it is a prevalent means of communication and information sharing between firm managers and analysts. Despite the theoretical importance of private interactions that occur through personal phone calls or meetings (Soltes, 2014), it is challenging for researchers to study these forms of impression management because of the difficulty of observation. Several studies have, however, managed to examine these interactions by surveying executives and analysts about their private interactions. Westphal and Graebner (2010) asked CEOs to fill out a survey which includes items about their communications with analysts during the previous year. They found that negative appraisals trigger verbal impression management toward analysts about the independence of their boards. Westphal and Clement (2008) administered surveys to securities analysts about the extent to which they have received personal or professional favors from executives. They found that such influencing tactics become more prevalent after firm earnings fall short of analyst forecasts, a circumstance under which impression management toward analysts becomes more necessary.

Critique of prior literature. The canvassing of prior literature reveals that the evaluative challenges faced by analysts, who play a key role in determining the market value of firms, is a problem that firm managers take seriously. Furthermore, the evidence suggests that pressures from analysts are not insurmountable; managers have considerable agency in shaping analysts' views and opinions about the firm. One missing piece in this literature on firm responses toward analysts, however, is an explanation of how analysts' evaluative challenges with regard to specific firm strategies can be overcome. As identified in the first part of the literature review, value-creating firm strategies often do not reach their full potential due to resistance and lack of information on the part of investors and analysts. However, other than studies that show how firms accommodate analysts by reshaping firm strategy, there is not much consideration of how analysts can be influenced such that they are more accepting and understanding of value-creating firm strategies. For example, how can executives influence analysts so that they can better understand strategies that are long-term oriented, shrouded in uncertainty, and deviant from existing firm actions? Theories of impression management should be combined with theories on firm strategies to better answer this question.

In this study, I use the exploration and exploitation framework to theorize about the relationship between firm strategy and analysts' evaluative challenges (Lavie et al., 2010), and managerial efforts to influence and help analysts. Furthermore, the notion of construal level is introduced as an underlying cognitive mechanism that explains the evaluative challenges of analysts with regards to ambidextrous strategies (Trope & Liberman, 2010). Then, I continue to draw from construal level mechanisms to develop predictions about CEO communications to help analysts overcome their evaluative difficulties regarding ambidextrous strategies.

3. THEORY AND HYPOTHESES

3.1. Firm strategy and analyst evaluation

Sell-side securities analysts play an important role as information bridges between firms and investors (Luo et al., 2015). Because investors are limited in their capacity to collect and analyze information about firms, they often rely on the evaluations by securities analysts in the form of reports, stock recommendations, and earnings forecasts. These evaluative outcomes by analysts are influential in directing investments to firms, and have considerable influence on firms' stock prices (Bradshaw, 2011). From the perspective of strategic decision-makers, this matters because analysts function as the conduits through which information about firm behaviors are scrutinized, interpreted, and delivered to investors. For example, firm executives may choose to pursue explorative or exploitative strategies based on their value-creation potential, but this potential may not be realized and may be considerably discounted if investors are unable to understand and appreciate these strategies.

Analysts are incentivized to produce evaluations (e.g., earnings forecasts and stock recommendations) that are accurate and value-adding for the investors that consume these evaluative outputs (Dechow, Hutton, & Sloan, 2000). In addition, analysts are incentivized to cover many firms to generate order flows and investment banking business for the brokerages they are employed in. Increasing the number of firms covered and the accuracy of evaluations is something analysts strive for, as it would help enhance their careers (Hong & Kubik, 2003). However, analysts also have limited time and resources to spend on evaluating any single firm, and thus are known to economize on their efforts. For example, specialization by industry is one of such efforts to optimize on analysts' inputs of time and effort (Brown et al., 2015).

An implication of these analyst incentives is that it is detrimental for firms to engage in firm strategies that are difficult to evaluate. Because of their incentives to cover many firms as accurately as possible with a limited amount of resources, analysts disfavor and seek to avoid covering firms that are demanding in their information processing requirements. For instance, firm strategies that are unique relative to industry norms are more likely to be dropped from analyst coverage due to high costs of collecting and processing information (Litov et al., 2012). Eventually, these firms experience a discount in their stock market performance because of reduced coverage and high information processing costs (Zuckerman, 1999). Therefore, the first part of this study seeks to understand how analysts' evaluative difficulties vary based on characteristics of firm strategy.

The main dependent construct, analyst evaluation, will be linked to the characteristics of firm strategy captured in the independent construct of organizational ambidexterity. A pictorial overview of this theoretical model is presented in Figure 6. The relationships depicted in this figure (main effects and moderating effects) are explained through mechanisms of construal level theory. The following sections will elaborate on this theoretical model.

3.2. Analyst appraisal of ambidexterity and mental construal

One way to understand firms' strategic behaviors is through the lens of exploration, exploitation, and ambidexterity (March, 1991). Exploration refers to the pursuit of new knowledge through variance-increasing activities, experimentation, and risk-taking (Levinthal & March, 1993). Conversely, exploitation is about the refinement of existing knowledge through activities that seek to reduce variance and increase efficiency (Lavie et al., 2010). Exploration is about investing in adaptation for the future, while exploitation is about capitalizing on existing competencies and knowledge to pursue near-term profits. Given that firms mostly operate in a changing environment, there is agreement in the literature that firms cannot prosper and survive by only exploiting (Cao et al., 2009). However, despite the potential benefits of ambidexterity, i.e., simultaneous pursuit of exploration and exploitation, it is also known to be challenging to achieve (Raisch & Birkinshaw, 2008).

Prior studies have focused on the challenges of pursuing ambidexterity from the perspective of internal organizational members such as managers and top executives (O'Reilly & Tushman, 2013; Smith & Tushman, 2005). A major theme is that the bounded-rationality, limited search, and myopic cognitive frames that managers hold is an obstacle to pursuing ambidextrous activities (Levinthal & March, 1993). In the current study, I shift the focus to a key group of external actors that evaluate firms—i.e., securities analysts—who face challenges in their appraisal of firms' ambidextrous behaviors due to analysts' limited cognitive capabilities, time, and access to firm-specific information. Given these underlying conditions, analysts would have to rely on their mental models in their filtering and processing of information to produce evaluative outputs such as stock recommendations and earnings forecasts (Beunza & Garud, 2007). In this study, I focus on an overlooked aspect of analysts' cognitions, which is the degree to which their mental models are abstract (high-level of construal) versus concrete (low-level of construal), as a mechanism that helps to explain how analyst evaluations are influenced by firms' ambidexterity.

From the perspective of an outside actor evaluating firms, exploration and exploitation are not equal in terms of difficulty of evaluation. The cognitive challenges in evaluating exploration-based strategies can be summarized by the following statement from March (1991: 73): "compared to returns from exploitation, returns from exploration are systematically less certain, more remote in time, and organizationally more distant from the locus of action and adaptation". This statement is worth unpacking further from the perspective of outside evaluators such as securities analysts. The first idea here is that exploration entails returns that may or may not materialize, so to appreciate explorative firm activities, evaluators need to focus on hypothetical rather than actual outcomes. The second idea is that outcomes from exploration are temporally distant rather than proximal: to comprehend exploration requires focusing on the future. The third, and final, part of the statement emphasizes that evaluating exploration requires understanding changes that occur far from a focal firm's familiar environment (i.e., cognitively and/or spatially distant from familiar loci of action and adaptation). Beyond the firm is the task environment, which concerns competitors, suppliers, and buyers within a particular industry; and beyond that is the macro-environment which concerns technological, economic, political, and social factors that lie beyond industry boundaries (Castrogiovanni, 1991). Exploration can thus be thought about as firms' attempts to learn from and adapt to their changing task and macro environments. As such, understanding such strategies requires evaluators to focus on factors located far beyond firm boundaries. For example, GM's decision to venture into electric cars with the Volt can be better understood as involving (1) high uncertainty; (2) temporally distant payoffs; and (3) unfamiliar technologies developed in response to emerging and formerly distant societal pressures regarding climate change (Alfred & Adam, 2009).

Drawing from construal-level theory (Trope & Liberman, 2010), it can be said that understanding the value of exploration activities requires external evaluators, such as analysts, to adopt a high level of mental construal in their appraisal of firm activities. High construal-level occurs when people think abstractly, focusing on the trees rather than the forest. Conversely, low construal-level entails concrete thinking that zooms in on specific details of objects or events rather than the bigger picture (Trope & Liberman, 2011). One of the key principles of construal level theory is that abstract, high-level mental models are linked with psychologically distant events.

Among several conceptualizations of psychological distance, the most commonly studied types are temporal, social, spatial, and hypothetical distance (Wiesenfeld et al., forthcoming). All of these dimensions are correlated with each other. For example, events construed as being temporally distant are also to some extent spatially and hypothetically distant. Linking this concept back to organizational exploration (as opposed to exploitation), it can be said that the understanding of organizational exploration requires a high-level mental construal (i.e,. abstract and decontextualized) that "is used to transcend the present and expand one's mental horizon by thinking farther into space and considering remote social targets and unlikely possibilities" (Trope & Liberman, 2011: 124).

We can take this discussion further by considering the requisite level of mental abstractness needed to evaluate ambidextrous firms, i.e., those engaging in exploration and exploitation simultaneously. Organizational ambidexterity involves combining two considerably divergent configurations of firm structures, processes, and activities based on different strategic logics (i.e., exploration and exploitation). Prior research suggests that organizational ambidexterity creates value when the different organizational elements are properly coordinated and integrated (Raisch et al., 2009; Smith & Tushman, 2005). When adopting a low-level mental construal, evaluators tend to group such organizational elements into narrow and separate categories (Wakslak et al., 2006). For analysts evaluating ambidextrous firms, this concrete, detail-oriented thinking would lead to the treatment of exploration and exploitation as mutually exclusive and distinct sets of activities that cannot be easily integrated. Conversely, when evaluators adopt a high-level mental construal, they would perceive broader categories that focus on the similarities and points of integration between exploration and exploitation rather than their differences (Trope & Liberman, 2011). Therefore, I argue that *abstract, big-picture thinking is what would be needed to understand and appreciate ambidextrous firms*.

3.3. Analyst challenges in evaluating ambidextrous strategy

I argued above that construal level in cognitions of external evaluators such as analysts can be conceptualized as a mechanism through which the evaluative outcomes of firm strategy can be explained. Specifically, I argued that proper evaluation of firms pursuing ambidextrous strategies would require high-levels of construal in the minds of analysts. However, there is reason to believe that analysts tend to evaluate firms based on a concrete and contextualized (i.e., low-level construal) mindset rather than one that is more abstract and big-picture oriented. As such, analysts will find it challenging to evaluate ambidextrous firms due to the mismatch between the low-level construal of their mental models and the requisite high-levels of construal for understanding these firm behaviors. I will explain this mismatch by first discussing why analysts generally would be incentivized and conditioned to evaluate firms using a concrete mental frame (i.e., low-level construal). Then, I will argue that what is needed to properly understand and appreciate ambidextrous strategy is an abstract, big-picture oriented lens. Hence, the greater the ambidexterity of firm strategy, the greater the mismatch and consequently the more negative analyst evaluations toward the firm will become.

The generally concrete, low-level construal of analyst evaluative frames. The concreteness of analysts' thinking can be partly explained by the way analysts' tasks are structured and performed. Temporally, analysts are typically required to evaluate and forecast firms' performance on a quarterly basis, in anticipation of firms' quarterly earnings announcements (Zhang & Gimeno, 2016). Relative to the long-term nature of the outcomes of exploration-oriented activities such as investments in developing new knowledge and technologies, which can take several years to materialize, this quarterly rhythm of evaluation is a significant constraint that limits analysts' time-horizon in their evaluation tasks. Relatedly, partly because estimates and stock recommendations are produced on a quarterly basis, analysts tend to rely on easily measurable metrics such as recent corporate earnings as inputs to their evaluations. Analysts are known to place less emphasis on features of firms that are non-financial and difficult to observe such as innovative capabilities and human capital (He & Tian, 2013).

Another notable aspect of analysts' tasks that restricts their mental horizon is specialization. Because analysts are required to appraise multiple firms with limited time and resources, it is efficient for them to choose a small number of industries, most often just one, and focus on building expertise in this particular niche (Brown et al., 2015). As such, analysts tend to develop an industry-specific perspective and knowledge-base which leads them to prefer to cover firms that conform to their narrow industry categories (Zuckerman, 1999). Industry boundaries reflect not only existing product categories but also a strong preference for the technological and commercial status quo. As a result, even firms that remain within the same industry product-wise (e.g., GM) would face pressures from analysts when they explore within their home industry (e.g., the Volt).

The preferences of investors, whom analysts cater to, can also provide a partial explanation for the concrete, low-level construal of analysts' evaluative mental models. Investors are often considered to be short-term oriented and disliking of uncertainty, and this is explained to some degree by investors' concerns about managerial opportunism that is difficult to monitor. Because investors do not place much confidence in the intentions of managers to utilize firms' assets in a manner beneficial for shareholders (Jensen & Meckling, 1976), they are generally skeptical toward slack resources and investments in resources that are difficult to observe and time-consuming to build (Jensen, 1986). Partially because of these investor preferences, analysts may be inclined to place greater emphasis on tangible assets rather than intangible assets and resources that are associated with long-term and uncertain returns (He & Tian, 2013). It is important to note, however, that there is considerable heterogeneity amongst groups of investors. Institutional investors, especially those that are categorized as 'dedicated investors', tend to be more patient and long-term orientated because they are well-equipped to monitor and understand firm resource investments (Bushee, 1998; Connelly et al., 2010).

The need for abstract, higher-level construal to appreciate organizational ambidexterity. By definition, organizational ambidexterity combines explorative and exploitive strategies. One of reasons analysts would face challenges in evaluating ambidextrous strategies is because exploration is more difficult and challenging to understand compared to exploitation only strategies. Exploration involves considerable investment in innovation capabilities and knowledge development, the value of which is difficult to measure and project into the future. That is, exploration requires a mental horizon that sees factors that are temporally far flung and also more expansive in terms of focus on environmental factors such as technological and regulatory changes (Adner & Kapoor, 2010; Flier, Van Den Bosch, & Volberda, 2003). The generally concrete mental frames that analysts bring to their evaluation tasks would therefore be incongruent with exploration, which is one aspect of organizational ambidexterity.

Another reason ambidexterity is difficult for analysts to appreciate is because their concrete mental frames makes more salient the differences between exploration and exploitation; appreciating the value of combining the two requires a more abstract and zoomed-out perspective. Exploration is driven by long-term adaptation concerns and is pursued through a decentralized and autonomous organizational structure while exploitation is aimed at achieving near-term efficiency and typically entails a centralized and tightly-coupled structure (Mom et al., 2007). The direction of knowledge flows in explorative strategy is generally from the bottom up (i.e., ideas generated at lower-levels are approved and built upon by top managers) whereas exploitative strategies are characterized by top-down knowledge flows, i.e., top managers mandate the course of action and lower level managers focus on implementation (Burgelman, 1983; Floyd & Lane, 2000).

This joining together of different sets of strategic goals, structures and directions of knowledge flows, can create evaluative difficulties due to the complex nature of such ambidextrous firms (Fiss, 2011). We can say that firms' behaviors are complex when the number of aspects to consider and the interconnections amongst them increase (Gavetti & Levinthal, 2000). To understand how different moving parts of the organization are integrated to form a coherent whole would require big-picture thinking, or high-construal levels in the minds of analysts. For instance, evaluating ambidextrous firms would require attention to the different types of activities, often spread across business units, and also consideration of how these different elements are integrated by top managers to create value (Smith & Tushman, 2005). Especially given their mental models generally construed at a low-level, analysts would be poorly equipped to deal with the complexities of ambidextrous firms. For example, studies show that individuals with mental models construed at a low-level face difficulties when evaluating situations that are complex (Thomas & Tsai, 2012).

Furthermore, organizational ambidexterity also creates inconsistencies and dissonance in the minds of evaluators due to the coexistence of seemingly-different types of strategic actions within the same organization (Andriopoulos & Lewis, 2009). Given the generally low-level construal of analyst' evaluation mindsets, these individuals would be sensitive to the contradictions and dissimilarities between explorative and exploitative firm actions (Backof, Thayer, & Carpenter, 2014). This can be explained by categorization processes boundedly-rational analysts would use to evaluate firms. Their concrete mental construal would lead to groupings of firm strategies into narrow categories that draw a distinction between the strategic actions of exploration and exploitation, not a broader and more abstract category that captures the complementarities and points of integration between exploration and exploitation.

In sum, ambidextrous strategies would present considerable evaluative difficulties for analysts because of the cognitive complexities and inconsistencies associated with such hybrid strategies. Furthermore, the typically low-level mental construal of analysts would lead to a narrow mental categorization of firm activities that makes the differences and points of conflict between exploration and exploitation activities appear more salient. These arguments lead to the following prediction:

H1: organizational ambidexterity is negatively associated with analyst evaluations—i.e., mean recommendations (H1a), number of analysts covering (H1b), and coverage breadth (H1c)

3.4. The moderating role of CEO language toward analysts

A natural follow-up question is: What can executives do to help analysts to better understand and appreciate ambidextrous strategy? According to the arguments above, there is a general tendency for analysts' mental representation to be construed at a low level. Such construal is incongruent with the high level (abstract) mental representations required to better understand ambidextrous firm strategies. While analysts generally bring concrete mental frames to their evaluation tasks, prior research shows that individuals' mental frames are fluid and can be influenced by external stimuli.

In particular, a large body of evidence suggests individuals' construal level is influenced by perceptions of distance in terms of its temporal, spatial, and hypothetical dimensions. While construal levels can be influenced through physical adjustments (e.g., by moving an object closer to an individual), this can also occur through verbal frames of distance. Prior laboratory research has shown, for example, evidence that experiment participants' construal levels shift to higher levels when an event is described as occurring in further away locations (Fujita, Henderson, Eng, Trope, & Liberman, 2006). Other studies in both laboratory and field settings have also shown that perceptions of distance can be influenced, and thus construal levels can be shifted to higher levels, when language is used that describes objects and events as occurring in the more distant future or in more spatially distant locations (Wiesenfeld et al., forthcoming).

I apply such mechanisms of construal level shifting based on verbal framing of distance to the context of firm-stakeholder relations. At this macro-level of analysis, studies have shown that firm executives can frame their verbal communication in various ways to influence the interpretation of outside constituencies such as analysts and investors (Washburn & Bromiley, 2013). For instance, it was found that investors' reactions toward a controversial action—i.e., poison pill adoption—was more positive when executives used a gain rather than loss frame to justify the action (Rhee & Fiss, 2014). In a study on CEO communications with analysts', it was found that CEOs' descriptions of firm corporate governance policies using frames of shareholder value maximization led to more favorable appraisals of the firm policy by analysts (Westphal & Graebner, 2010).

To overcome their lack of information about the inner workings of firms, analysts rely considerably on interactions with managers to obtain information and insights that would help their evaluations (Bradshaw, 2011). Among several routes through which top managers can interact with analysts, I focus on management-analyst conference calls. In U.S. publicly-traded firms, these are institutionalized events in which CEOs, along with other executives, are given the opportunity to provide a verbal account on the overall operations of the firm, address issues that influenced the firm's prior quarter performance, and offer guidance on what can be expected of the firm in the following quarters (Washburn & Bromiley, 2013). In addition to providing new information, managers can influence analysts' interpretation of the firm's situation and its activities through their verbal accounts in conference calls.

In the following hypotheses, I will propose that (1) CEO language that is more abstract and reflecting of greater psychological distance (hypothetical and temporal) positively moderates the relationship between firm ambidexterity and analyst evaluation. I further argue that shifts in analyst' mental construal level due to CEOs' language is the unobserved theoretical mechanism through which this moderating effect occurs. These relationships are summarized in Figure 6.

Psychological distance and abstractness in CEO language. As the first step to establishing the moderating effects of CEOs language, I argue that such language could be framed in ways that reflect different degrees of psychological distance and abstractness. Frames can be understood as 'schemes of interpretation' that highlight certain aspects of an event to make it more salient and noticeable to audiences (Goffman, 1974). These frames can be used strategically in verbal communications to encourage more favorable interpretations of information while discouraging unfavorable perceptions (Rhee & Fiss, 2014). Because CEOs have considerable discretion in choosing what they talk about in their interactions with analysts, numerous types of frames could be used. For example, the content of frames could vary in terms of emphasis on gains versus losses, stakeholder orientation, and internal versus external attributions (Clapham & Schwenk, 1991; Fiss & Zajac, 2006; Rhee & Fiss, 2014).

Among the possible frames, I focus on the dimensions of abstractness and psychological distance in verbal frames because of its relevance to the cognitive challenges of ambidexterity in firm strategy. Applying the notion of psychological distance to the concept of verbal frames, we can think about varying degrees of temporal, spatial, and hypothetical distance in CEOs' verbal frames. Greater temporal distance in verbal framing would entail highlighting and drawing attention to future states rather than the current situation. More spatially distant verbal frames would emphasize firms' environments as opposed to their firms' internal operations. Finally, greater hypothetical distance in the framing of CEOs' verbal accounts would draw audiences' attention to possibilities instead of known certainties.

Greater use of these dimensions of psychological distance in CEO verbal accounts will help shift analysts' mental frames towards a higher level. Consistent with this argument, prior research shows that describing objects as occurring in the uncertain future and in more remote locations leads to enhanced sense of psychological distance towards objects, which in turn leads to a more abstract mental construal (Trope & Liberman, 2011). That is, different dimensions of psychological distance (e.g., temporal and hypothetical) have shown to be positively associated with high-level, abstract mental representations in various research settings and contexts (Trope & Liberman, 2010). I argue that this relationship can similarly be applied to understanding the relationship between CEOs' language toward analysts and the mental frames analysts use in their evaluations.

Moderating effect of CEO language. I will further explain how CEO language that reflects greater psychological distance and verbal abstractness will help analysts' evaluations of ambidexterity.

By using more distant verbal frames, CEO would be able to assist analysts' understanding of firm exploration. Given that ambidexterity is about combined exploration and exploitation, helping analysts better comprehend and appreciate exploration (which is cognitively more challenging to understand than exploitation) is an important necessary condition toward appreciation of ambidexterity. Given their short-term oriented task structure (i.e., quarterly earnings cycle) analysts may find it difficult to evaluate firms that pursue development of new products that require considerable time to yield results. By providing verbal accounts that highlight what is possible in the future, CEOs could help analysts better comprehend explorative firms.

More specifically, I argue that this enhanced understanding of explorative strategies occurs through analysts' shift towards higher levels of mental construal. As argued above, the difficulties analysts face in evaluating explorative strategies can be explained by construal level mismatch—i.e., there is incongruence between the high-level construal required to understand explorative strategies and the generally low-level mental construal of analysts. Through CEO verbal accounts framed distally, the difficulties analysts face in evaluating explorative firms can be alleviated by bringing their mental frames closer to the high-level construal required to understand firm exploration. That is, CEO linguistic frames that reflect higher psychological distance would trigger higher levels of mental construal in analysts, and this higher level mental construal in turn would help alleviate some of analysts' evaluative difficulties due to construal level mismatch.

The proposed argument assumes variance in CEOs' willingness and capability to use distant verbal frames. That is, if all CEOs were equally able to tailor their communications toward analysts such that they employ more distal frames when engaging in explorative strategy, there would be no variance in framing across CEOs. However, the use of more distal verbal frames constitutes a non-obvious and challenging effort for CEOs based on the following reasons. First, CEOs may find it unnecessary to look into the far and uncertain future, as their tenures tend to be relatively short. Second, CEOs could avoid the use of forward-looking and tentative frames because they may be held accountable for the information they provide. Finally, CEOs could eschew discussion of future plans because of the threat of imitation by competitors. Therefore, the use of distal verbal frames is a non-obvious effort that CEOs can engage in.

The use of more distal frames in CEO verbal accounts could also help with the challenges analysts would face in appreciating the combination of exploration and exploitation—i.e., organizational ambidexterity. Due to tendencies for seeking cognitive consistency (Festinger, 1957), analysts would find it challenging to comprehend events that comprise conflicting categories. Ambidextrous strategies entail considerable cognitive dissonance and difficulty of understanding because it combines actions that are associated with two different strategic logics (Andriopoulos & Lewis, 2009, 2010)—i.e., exploration and exploitation. The generally low-level construal of analysts' mental models would make these cognitive challenges and inconsistencies more salient, as low level construal triggers grouping of objects into narrow categories based on their differences than similarities (Liberman, Sagristano, & Trope, 2002; Smith & Trope).

Instead, what is needed for analysts evaluating such ambidextrous firms is high-level construal, or big-picture thinking. When thinking more abstractly, analysts would be able to comprehend firm actions in terms of broader categories that encompass exploration and exploitation and focus on the commonalities between them rather than their differences (Trope & Liberman, 2011). As value from organizational ambidexterity is created through the combination of different strategic logics (Raisch & Birkinshaw, 2008), understanding the common bases of integration is important.

Consistent with the prior hypotheses, I argue that analysts' mental construal will shift to a higher level when CEOs use more abstract and distal verbal frames in their verbal accounts. This shift towards a 'big picture' view of the firm would help analysts' understanding of ambidextrous firms as they will be able to better perceive the points of integration and commonalities between exploration and exploitation activities that need to be combined to create value. Given that the dependent construct, analyst evaluation, is comprised of three sub-constructs, I offer the following set of predictions:

H2a: CEOs' language reflecting higher construal levels—verbal abstractness, future focus, and tentativeness– positively moderates the relationship between organizational ambidexterity and mean analyst buy recommendations

H2b: CEOs' language reflecting higher construal levels—verbal abstractness, future focus, and tentativeness– positively moderates the relationship between organizational ambidexterity and analyst coverage

H2c: CEOs' language reflecting higher construal levels—verbal abstractness, future focus, and tentativeness– positively moderates the relationship between organizational ambidexterity and coverage breadth

4. METHODS

4.1. Empirical context: Conference calls in the Regulation Fair Disclosure era

Regulation Fair Disclosure (Reg. FD), which went into effect in 2000, is relevant to interpretation of the conference call data that I rely on. This regulation was adopted by the SEC to curtail the possibility of certain analysts and investors from getting an unfair advantage through their private information obtained from firms (Bailey, Li, Mao, & Zhong, 2003). Specifically, the regulation prohibits firms from sharing material private information to analysts or investors in any form. In the case that such information was shared in private, it must be made publicly available within 24 hours. Failure to comply with this regulation is punishable through SEC enforcement action.

Because all of the data for this study is from the post-Reg. FD era, there are several implications to note. First of all, as this regulation has significantly reduced the possibility of analysts' obtaining private information through personal contacts, analysts are likely to seek greater information from publicly open communications with managers such as through conference call meetings. Relatedly, since private information is harder to obtain, analysts are likely to pay closer attention to executives' verbal accounts during conference calls. These implications suggest that post-Reg. FD data on conference calls would be an appropriate context to test how firms' ambidextrous strategies affect analysts' evaluations, and how this can be influenced by managers' verbal framing efforts.

4.2. Sample and data sources

Sample. The initial sample frame for this study was publicly-traded firms in high-technology industries (internet, software, and pharmaceuticals; SIC codes 2834, 7370, 7372, 7373) during the years 2001-2015. I focused on these industries because it is a context in which issues of ambidexterity are particularly salient theoretically, and because for my measure of organizational ambidexterity I relied on a dictionary of exploration and exploitation words developed in this context (McKenny et al., Forthcoming). High-tech industries are known to provide high levels of managerial discretion to executives, so it is a context in which what executives say to analysts in conference calls would matter. This time period of 2001-2015 was chosen because conference call transcripts were made widely-available starting from 2001, the year after Regulation Fair Disclosure went into effect. The total sample size after accounting for missing data was 1,114 firm-years for 124 unique firms.

Quarterly earnings call transcripts. I collected transcripts of quarterly earnings calls from the Thomson Street Events database. Earnings calls consist of (1) a management discussion session in the form of a presentation delivered by company representatives such as the CEO or CFO and (2) a Q&A session between executives and participating analysts. I will use data from the Q&A session to measure CEOs' language. These transcripts are structured consistently in terms of labels that identify speakers and their associated verbal utterances. Using Python programming language and Regular Expressions (Regex), I was able to automatically parcel out the text data attributable to CEOs.

Other data sources. Data for the key dependent variables related to analyst evaluation were obtained from Institutional Brokers' Estimate Service (I/B/E/S). Data for organizational-level variables were obtained from Compustat and institutional ownership percentages were collected from the Thomson Reuters Institutional Holdings dataset.

4.3. Dependent variables: Analyst evaluation

I use three different indicators as dependent variables, each of which tap into different aspects of analysts' evaluations. *Mean analyst (buy) recommendations* was measured as the average consensus recommendation for a firm in a given year, as recorded in I/B/E/S. This variable is originally coded such that a higher number means analysts' recommendations are unfavorable

(1="strong buy," 2= "buy," 3 ="hold," 4= "underperform," and 5 = "sell"). Therefore, I reverse coded this variable such that a higher number means analysts are more favorable toward the firms' stock.

Analyst coverage was measured as the count of the number of analysts issuing earnings per share annual forecasts, as reported in I/B/E/S. This variable is assumed to be an indicator of positive evaluations, as analysts might simply drop coverage of firms that they find difficult to evaluate, potentially leading to a reduction in firms' market value (Litov et al., 2012). A notable feature of the current sample is the low percentage of cases in the final sample that do not receive any analyst coverage (analyst coverage was zero for only 0.08% of the sampled firm-years). Therefore, the measure of analyst coverage in this study is not subject to zero-inflation. This is notably different from Litov et al. (2012), who reported that 44% of the firms in their sample did not receive any coverage from analysts. However, this can be explained by the fact that Litov et al. sampled broadly and included all industries, whereas the current study samples from high-tech industries and only includes firms that have earnings call transcripts available.

Analyst coverage breadth was measured as the average number of other firms covered by a focal firm's analysts. The reasoning behind this measure is that analyst have limited time and resources to devote to their stock research, so if a focal firm is difficult to evaluate analysts will have to reduce their coverage of other firms (Barth et al., 2001).

4.4. Independent variable: Organizational ambidexterity

In operationalizing this variable, I follow research that conceptualizes ambidexterity as the combination of exploration and exploitation (Gibson & Birkinshaw, 2004), rather than as the absolute difference in levels of exploration and exploitation. The latter type of operationalization, based on the 'balancing' view of ambidexterity, assumes that exploration and exploitation are crowding out each other and thus cannot be easily pursued simultaneously. In the current sample, I find that the correlation between exploration and exploitation is positive and moderately large (Pearson correlation = .32; Spearman correlation = .4). This suggests, at least in the current sample, that exploration and exploitation are not as incompatible as the balancing view suggests, and there is not a ‘crowding out’ effect between the two. Therefore, I follow the combining view, which is a synergistic view of organizational ambidexterity. In line with prior research following this perspective (He & Wong, 2004), I measured organizational ambidexterity as the *multiplication of separate measures of exploration and exploitation (i.e., exploration X exploitation)*.

Consistent with prior studies of organizational ambidexterity (Stettner & Lavie, 2014; Uotila et al., 2009), I relied on content analysis to measure exploration and exploitation activities. An advantage of this approach is that it could capture a wide range of firm actions that are not easily measurable using firms’ financial data. Furthermore, this text-analytical approach can also help overcome the common-methods and self-report biases that are common in survey-based measurements of organizational ambidexterity. I relied on the Management Discussion and Analysis (MD&A) section of firms’ 10-K filings as the source of text to be analyzed for its content. Using the dictionary developed by McKenny et al. (Forthcoming) and the LIWC software, I calculated the proportion of exploration and exploitation-related words for each firm-year. According to McKenny et al.’s dictionary, firm-level exploration can be identified through words and phrases such as “breakthrough", "experiment", "experimental", "new product", and "new system", and exploitation is indicated by words and phrases such as “existing offering", "existing product", "existing technology", “current products", and "efficiency". The full word list can be found in the Appendix.

4.5. Moderating variables: CEO language reflecting higher construal level

I follow prior work in management that uses proportions of different categories of words or parts of speech to capture levels of construal or abstractness in language (Pan, McNamara, Lee, Haleblian, & Devers, Forthcoming; Reyt & Wiesenfeld, 2015).

The first variable, *CEO verbal abstractness* is measured using parts of speech (POS) that reflect different degrees of abstractness or concreteness according to the Linguistic Category Model (LCM) developed by Semin and Fiedler (1991). In order of abstractness, these parts of speech are: adjectives (ADJ; e.g., aggressive, helpful), state verbs (SV; e.g., to love, to hate), interpretive action verbs (IAV; e.g., to help, to hurt), and descriptive action verbs (DAV; e.g., walk, hit). To identify these words in conference call transcripts, I wrote Python code that uses a part-of-speech tagging algorithm to identify and count adjectives, verbs, and nouns in CEOs' utterances in earnings call transcripts. Because POS tagging does not distinguish between types of verbs to the precision required by the LCM, I relied on a dictionary developed by Seih, Beier, and Pennebaker (2017) that distinguishes between DAV, IAV, and SV. CEO verbal abstractness, then, was calculated as the frequency of words weighted by their abstractness according to the following LCM model formula (Douglas, Sutton, & Wilkin, 2008): $(ADJ\times4 + SV\times3 + IAV\times2 + DAV) \div (ADJ + SV + IAV + DAV)$. This computerized measurement of LCM scores was compared with manually-coded scores in a study by Reyt, Wiesenfeld, and Trope (2016), and they find strong agreement between the two methods ($r = 0.72$, $p < 0.01$).

The second variable, *CEO future focus* is measured as the extent to which CEOs use language that is oriented to situations in the future as opposed to those in the past. Following prior research (Pan et al., Forthcoming), I operationalize this as the standardized proportion of words that is future focused minus the standardized proportion of words that capture past focus in CEOs' earnings call Q&A session utterances. To capture the relevant proportion of words, I used the Linguistic Inquiry and Word Count (LIWC) 2015 dictionary (Pennebaker, Boyd, Jordan, & Blackburn, 2015)—specifically the categories of future focus and past focus. The future focus category comprised of 97 words which include "may," "will," and "soon," and the past focus category consists of 341 words including "ago," "did," and "talked".

The third variable, *Hypothetical distance* was measured as the standardized proportion of tentative words subtracted by the standardized proportion of certainty words in CEOs' Q&A session transcripts. according to the LIWC 2015 dictionary. The tentative category comprises of 178 words including "maybe", "assuming", and "perhaps," and the certainty category consists of 113 words such as "absolutely", "never", and "always."

4.6. Control variables

To mitigate the risk of omitted variables bias, I included variables that are known to be related to different forms of analyst evaluation and CEOs' use of language. At the firm level, I accounted for *institutional ownership* (% of shares held by institutional investors), given that financial analysts are dependent on institutional investors and may be influenced by them (Ljungqvist, Marston, Starks, Wei, & Yan, 2007). I also controlled for *firm size*, measured as the natural logarithm of total revenues. Given the known influence of firm diversification on analyst evaluations and coverage (Litov et al., 2012), I controlled for *related diversification* and *unrelated diversification*, both of which were calculated using entropy-based measures (Hoskisson, Hitt, Johnson, & Moesel, 1993). I also controlled for two different forms of firm performance given that analysts' appraisals are likely to take into account how well firms are doing in terms of market and accounting-based criteria. *Return on assets* was calculated as net income divided by total assets and an approximation of *Tobin's Q* was calculated by taking market value of assets (market capitalization of equity + book value of debt) and dividing it by the book value of assets. It was also important to account for *R&D intensity* (research and development spending divided by total sales) and *capital intensity* (capital expenditures to total sales), given the known relationship between such investments and analyst evaluations (Benner & Ranganathan, 2012). I also controlled for a *R&D missing* dummy variable because the missing values of research and development (18% missing in the current sample) were coded as zero for the R&D intensity variable (Henderson, Miller, & Hambrick, 2006). As research shows that intangible assets influence analyst coverage and evaluations (Barth et al., 2001), I also accounted for a measure of *intangible assets* (recognized intangible assets to total assets) as well as *advertising intensity* (advertisement expenditures divided by total sales). I also included *financial leverage* (long-term book debt to total assets) and *sales growth* (year-on-year percentage change in total sales), given their potential influence on analyst evaluations (Litov et al., 2012; Luo et al., 2015). To account for changes in in analysts' sentiments across time, I included a *year clock* variable that captures the number of years elapsed since the beginning of the sample period.

At the CEO level, I controlled for *CEO positive sentiment*, as analyst evaluations might be influenced by the valence of CEOs' verbal communications. It is measured as the proportion of words in CEO utterances captured by the positive emotion category in the LIWC 2015 dictionary. I also controlled for *CEO fog index*, calculated as the addition of average number of words per sentence and proportion of words that are greater than six characters (Bushee et al., 2015). This measure captures the extent to which CEOs use unclear and obfuscating language, and it is potentially a correlate of verbal abstractness as well as analyst evaluations.

4.7. Analytical approach

To test the hypotheses, I relied on panel regression techniques. To choose between random and fixed effects models, I conducted Hausman tests for models in which the dependent variable is analyst mean recommendations and coverage breadth (Hausman, 1978). In both sets of tests, the results suggested that a fixed effects approach should be preferred ($p < .05$ in both cases). Given this choice, there is a reduced risk of firm-specific omitted variables biasing the estimates, and hypotheses are tested using only within-firm variance. I used fixed effect Poisson regression to estimate models predicting analyst coverage (i.e., number of analysts covering a firm), which is a count dependent variable. Despite over-dispersion of the analyst coverage variable, I did not use negative binomial models as they do not provide for true fixed-effects analysis (Allison & Waterman, 2002). To mitigate problems of reverse causality, the dependent variable was always measured one year after the predictor variables (i.e., t+1).

5. RESULTS

The descriptive statistics and correlations for all variables are reported in Table 5. An examination of the zero-order Pearson correlations between organizational ambidexterity and analyst evaluation (mean recommendations, analyst coverage, coverage breadth) does not reveal any strong relationships. These numbers are not necessarily informative in terms of theory testing, as the hypotheses will be evaluated using multivariate firm-fixed effects regressions that account only for within-firm variance, while accounting for a host of control variables. To test for potential multicollinearity, I calculated variance inflation factors (VIFs) for the final models predicting the three different analyst evaluation variables. In all of these models the mean VIF was less than 1.5, and highest VIF for any predictor across all models was 2.7. This is well below the benchmark value of 10 to detect collinearity issues (Cohen, Cohen, West, & Aiken, 2013).

In Hypothesis 1, I predicted that there will be a negative influence of organizational ambidexterity on analyst evaluations in terms of mean buy recommendations (H1a), number of analysts covering (H1b), and coverage breadth (H1c). Table 6, Model 1 reports the fixed effects regression results that test Hypothesis 1a. Although it is treated as a control variable, it is noteworthy that unrelated diversification has a negative and significant influence on analyst buy recommendations. This finding can be explained by prior research that shows analysts tend to specialize by industry and thus would find it difficult to appreciate firms diversified into unrelated product categories (Zuckerman, 1999, 2000). Regarding my main variable of interest in Model 1 of Table 6, there is a negative and marginally significant relationship ($p < .1$) between organizational ambidexterity and mean analyst (buy) recommendations. This finding lends marginal support to Hypothesis 1a. According to Model 1 of Table 7, there is no significant relationship between organizational ambidexterity and analyst coverage. Similarly, Model 1 of Table 8 indicates that there is no statistically significant influence of organizational ambidexterity on analyst coverage breadth. Therefore, H1b and H1c are not supported by the data. Overall, there is only marginal support for Hypothesis 1: organizational ambidexterity has a negative and marginally significant influence on mean buy recommendations (H1a) and it has no relationship with analyst coverage and coverage breadth.

In Hypothesis 2a, I argued that the relationship between organizational ambidexterity and mean analyst buy recommendations would be positively moderated by CEO language reflecting higher levels of construal—verbal abstractness, future focus, and tentativeness. Table 6 shows the result of the fixed effects regression models used to test this idea against my data. I entered the interaction terms for verbal abstractness in Model 2, future focus in Model 3, and tentativeness in Model 4, and I entered all the interaction terms in Model 5. The full model, Model 5, indicates that there is positive and significant moderating effect of CEO verbal abstractness ($p < .05$) and CEO tentativeness ($p < .05$), but not CEO future focus. This finding offers mixed support for Hypothesis 2a: two of the three CEO language moderators are positive and significant in the predicted direction.

These moderating effects suggested in Hypothesis 2a can be understood better through graphical depictions. Figure 7 depicts the moderating effect of CEO verbal abstractness on the relationship between organizational ambidexterity and analyst mean (buy) recommendations. The overall downward sloping lines in this figure are consistent with the finding of a negative and significant main effect of organizational ambidexterity. What is interesting is that the magnitude of these negative effects varies according to CEO verbal abstractness. This figure shows that compared to when CEO verbal abstractness is low (one standard deviation below the mean), the effect of organizational ambidexterity on analyst recommendations is attenuated (i.e., the slope is less negative) when CEO verbal abstractness is high (one standard deviation above the mean). A post-hoc test shows that the relationship between organizational ambidexterity and analyst recommendations is negative and significant when CEO verbal abstractness is low (b = -.65; p < .01) or at an average level (b = -.46; $p < .05$) but this relationship is *not significant* at high levels of CEO verbal abstractness (b = -.27; *n.s.*). When CEOs use highly abstract language to communicate with analysts, the negative effects of ambidexterity on analyst recommendations is neutralized.

Figure 8 graphically represents the moderating effect of CEOs' tentative language. The negative and significant main effect of ambidexterity provides the overall downward sloping lines seen in this figure. However, the magnitude of these negative effects is contingent on the tentativeness of CEO language. Compared to when CEO verbal tentativeness is at a low level (one standard deviation below the mean), the negative relationship between organizational ambidexterity and analyst recommendations is attenuated (i.e., the slope becomes less negative) at mean levels of CEO tentativeness. This relationship is further attenuated, and the negative effect is further neutralized when CEO verbal tentativeness is high (one standard deviation above the mean). A post-hoc test shows that the relationship between organizational ambidexterity and analyst recommendations is negative and significant when CEO tentativeness is low (b = -.71; $p < .01$) or at the mean level (b = -.47; $p < .05$). This relationship, however is *not significant* when CEO verbal tentativeness is high (b = -.23; *n.s.*). This implies that the negative influence of organizational ambidexterity on analyst recommendations is neutralized, and no longer detectable, when CEOs use highly tentative language to communicate with analysts.

Hypothesis 2b suggested that CEO language of higher level construal would positively moderate the relationship between organizational ambidexterity and analyst coverage (i.e., number of analysts covering a firm). Model 5 of Table 7 shows the fixed effects regression results that tests this prediction. Of the three interactions between organizational ambidexterity and CEO language, only tentativeness is significant ($p < .01$) but the direction of the effect is negative, which is opposite of the prediction. There is no detectable moderating effect of CEO verbal abstractness nor CEO future focus. Therefore, Hypothesis 2b is not supported.

In Hypothesis 2c, I predicted that CEO language reflecting higher-level construal (i.e., the big picture) would positively moderate the influence of organizational ambidexterity on analyst coverage breadth. The results of fixed effects regression models testing this hypothesis are presented in Table 8, Model 5. According to this model, interaction of organizational ambidexterity with CEO verbal abstractness is significant ($p < .05$) and negative, which is the opposite of what has been predicted. Similarly, the moderating effect of CEO tentativeness is marginally significant ($p < .1$) in the negative direction, which is also opposite of the predicted effects. The moderating effect of CEO future focus was not significant. Taken together, there is no support for Hypothesis 2c, and two out of three moderators are significant in the opposite direction of the prediction. This unexpected and potentially interesting finding will be further explained in the discussion section which follows.

Regarding these findings, one might point out that the effects of organizational ambidexterity could be better understood by accounting for the effects of exploration and exploitation separately. This is a reasonable concern given that organizational ambidexterity is operationalized as the multiplication of separate measures of exploration and exploitation. To address this concern, I re-estimated the abovementioned models by including separate measures of exploration and exploitation as predictors. These robustness checks are reported in Table 9. The results show that the findings are by and large robust, even when accounting for the effects of organizational exploration and exploitation simultaneously. It is notable, however, that in Model 1 of Table 9, there no longer is a statistically significant negative relationship between organizational ambidexterity and mean buy recommendations. The existing marginal support for Hypothesis 1a, therefore, does not hold up when accounting for exploration and exploitation separately.

6. DISCUSSION

Do analysts find it difficult to understand and appreciate ambidextrous strategies? If so, what can CEOs do in their communications with analysts to help with this problem? I raised these two questions in this essay, drew from construal level theory to derive predictions, and used archival data to put these ideas to the test. This study is timely and important given the state of the literature on organizational ambidexterity and the interface between strategy and analysts. Despite decades of research on organizational ambidexterity (i.e., simultaneous exploration and exploitation) there is need for better understanding of the firm performance implications of this key strategy construct. Analysts, given their key role in evaluating stocks, are a potential gatekeeper that firms need to convince if they are to succeed in difficult-to-understand strategies that incorporate both long-term and short-term goals.

I find limited support for the first broad idea, that organizational ambidexterity is negatively associated with analyst evaluations. This idea received support, only when the dependent variable was mean analyst recommendations, and even this relationship was only marginally significant ($p < .1$). There is no evidence in the data that analysts drop coverage or reduce their coverage of other companies as organizational ambidexterity increases. Taken together, the results suggest that analysts may not favor firm strategies that combine exploration and exploitation, but they do not necessarily drop coverage of those firms or reduce coverage breadth based on firms' ambidexterity alone.

I also find limited support for the second broad idea, that CEOs can use 'big picture' (i.e., higher construal level) language to help analysts better understand and appreciate ambidextrous strategies. When analyst evaluations were assessed using mean (buy) recommendations, there was a significant positive moderating effect of two of the CEO language variables: verbal abstractness and tentativeness. Further examination of these moderating effects, however, revealed that CEO language that is highly abstract or tentative does not bring about a positive relationship between organizational ambidexterity and mean analyst recommendations. Instead, it allows neutralization of negative evaluation outcomes due to organizational ambidexterity.

Perhaps the most striking and unexpected finding to emerge from this study is the moderating effects of CEOs' abstract and tentative language that were significant in the opposite direction of the predictions, in models where the dependent variables were analyst coverage (i.e., number of analyst covering a firm) and coverage breadth (i.e., the average number of firms followed by analysts covering a focal firm). While these measures were theorized to tap into analyst evaluation, the inverse of these measures can be seen as indicative of a specific aspect of analyst evaluation: the effort that goes into the evaluation (Barth et al., 2001). The dropping of coverage is a sign that analysts are burdened by the time and effort required to follow a particular firm, and similarly the reduction of the breadth of coverage by analysts watching a focal firm suggests that the focal firm requires much time and effort to understand (Litov et al., 2012). In models predicting analyst coverage and coverage breadth, the interaction between organizational ambidexterity and CEOs' use of abstract and tentative language is negatively related to analyst coverage and coverage breadth. That is, when firms are ambidextrous, analysts find it even more difficult to understand the firms' strategy when CEOs are also talking about the firm using abstract and tentative language.

Although this pattern of findings is unsupportive of the proposed theory, it sheds light on a potentially interesting paradox: the use of 'big picture' language to explain ambidextrous firm actions might help with analyst recommendations, but at the same time it might also *increase* rather than reduce analysts' cognitive efforts. The implication of this finding is that when CEOs pair abstract and tentative language with ambidextrous strategies there is a benefit in terms of analyst recommendations but also a cost in terms of reduced analyst coverage and reducing of breadth of coverage for analysts.

6.1. Limitations and directions for future research

In light of the limited support for my predictions and discovering of unexpected patterns in the data, one of the limitations of this study appears to be the oversimplified treatment of analyst evaluations. Although I considered analyst recommendations, coverage, and coverage breadth to all be indicators of better analyst evaluations, the data suggests these are actually different constructs that tap into different aspects of analyst evaluations. A closer look at correlations reported in Table 5 reveals that there is not strong cohesion amongst the analyst outcome variables. In fact, although the correlation is small, there is a negative association between analyst mean buy recommendations and analyst coverage (r = -.08; $p < .05$). This means that, contrary to my expectation that issuance of buy recommendations and decisions to cover a firm are both indicative of better analyst evaluations, the data suggests these two variables do not go hand in hand. Instead, if anything, there is a negative association between coverage of firms and mean buy recommendations. This finding lends support to a more nuanced treatment of the three different analyst outcome variables. What the current findings suggest is that firm strategies (in terms of combinations of firm actions and CEO communication) do not influence analyst recommendations and coverage decisions in the same way.

In light of this limitation, a direction for future research is to revise the theory such that it takes into account the different mechanisms that drive analyst recommendations and coverage decisions. It is entirely possible that the factors that led analysts to recommend stocks look very different from the factors that led them to cover that firm in the first place. This line of inquiry might provide an opportunity to contribute to the literature on analyst evaluations, as some studies feature buy/sell recommendations as their main analyst-related variable (Benner & Ranganathan, 2012; Luo et al., 2015) while others treated coverage or breadth of coverage as their main analyst variable (Barth et al., 2001; Litov et al., 2012); however, these different aspects of analyst evaluations have rarely been considered at the same time in a single study.

Another shortcoming of this study—revealed through the data—is the lack of support for a basic idea behind construal level theory, which is that indicators reflecting greater psychological distance should correlate with each other, and they should also be positively associated with indicators of abstractness. The correlations presented in Table 5 show that CEO verbal abstractness, future focus, and tentativeness are not highly correlated. There is barely a correlation between abstractness and future focus (r = .06), virtually zero connection between future focus and tentativeness (r = -.01) and negative rather than positive relationship between abstractness and tentativeness (r = -.09). One possibility is that the basic ideas behind construal level theory, which were mostly tested in laboratory settings in prior research, do not translate well to the current setting of CEO language use. Another possibility is that there is an issue with construct validity, i.e., the measures I used to capture different dimensions of CEO language are not capturing those dimensions properly.

Future research could address this limitation in several ways. Given the lack of association amongst what I assumed to be related indicators of CEOs' language reflecting construal levels, future studies could take a more nuanced view of the different dimensions of language (i.e., abstractness, future focus, and tentativeness). Each of these might have unique mechanisms through which they influence analyst evaluations, and it is also possible that interactions amongst these dimensions could predict outcomes. Another avenue would be to take a more detailed look at the dictionaries used to capture CEO language and find ways to improve measurement, perhaps by including more words that are specific to the context of the study (i.e., earnings calls).

Finally, this study only takes into account the language of CEOs, which also can be seen as a limitation. Although CEOs are typically the most influential actors within companies, other top executives such as Chief Finance Officers (CFOs) would also play an important role in earnings call settings. In fact, it would be interesting to examine whether analysts are influenced only by what CEOs say in earnings calls or of they also pay close attention to the language of CFOs. Congruent with what is expected by their roles, it is possible that analysts might favor more abstract communications from CEOs while preferring more concrete language from CFOs. These are questions worthy of further investigation in future studies.

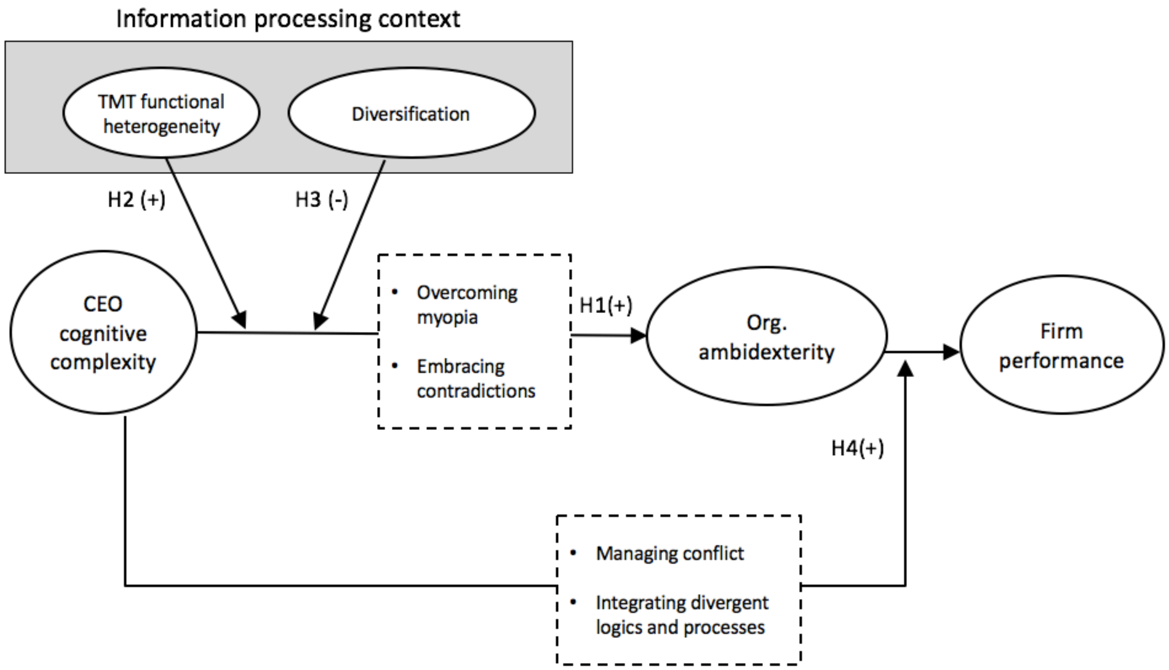
6.2. Conclusion

Organizational ambidexterity presents a challenge to analysts evaluating firms, in particular when it comes to buy/sell recommendations. Because strategies that combine short-term exploitation and long-term exploration are incongruent with the generally narrow cognitions that analysts bring to their evaluation tasks, ambidextrous strategies tend to receive weaker recommendations by analysts. Consistent with their outward facing role as representatives of firms, CEOs are able to mitigate this problem through their communications with analysts. When firms are pursuing ambidextrous strategies, CEOs can help neutralize the evaluation discount problem by using language that is more abstract and tentative – i.e., language that helps bring analysts' evaluative frames to a higher level of abstractness that is more consistent with the nature of the strategy the firm is pursuing.

Through these findings, this study potentially contributes to the ambidexterity literature by pointing to a potential roadblock in creating value through combined exploration and exploitation (i.e., discounted analyst recommendations) while at the same time pointing to a potential solution in CEOs' verbal frames of abstractness. This study also uncovers an interesting paradox of CEOs' use of abstract, 'big picture' language: when coupled with ambidextrous strategy, it may serve to increase the effort analysts put into covering any particular firm, and it may reduce the overall coverage of firms. This study also helps enable future studies in the intersection of firm strategy and analyst evaluation by suggesting several paths for additional studies.

TABLES AND FIGURES

Figure 1: Theoretical model



Note: Ovals indicate measured variables in the hypotheses.
Dotted boxes show theorized, intervening, unmeasured

Table 1: Descriptive statistics and correlations

Variables	Mean	S.D.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. Organizational ambidexterity	0.14	0.16	1.00																			
2. CEO cognitive complexity	0.16	2.40	0.07	1.00																		
3. TMT functional heterogeneity	0.67	0.12	0.05	-0.15	1.00																	
4. TMT size	5.56	2.71	0.04	-0.10	0.54	1.00																
5. TMT tenure heterogeneity	0.61	0.30	0.01	-0.10	0.23	0.26	1.00															
6. Industry dynamism	0.02	0.01	-0.05	0.17	-0.12	-0.06	0.02	1.00														
7. Fog index	38.75	4.59	0.01	-0.22	0.05	0.06	-0.01	-0.09	1.00													
8. CEO power	-0.01	1.79	-0.01	0.03	-0.16	-0.20	-0.11	0.05	-0.07	1.00												
9. R&D missing	0.19	0.39	-0.34	0.09	-0.21	-0.13	-0.10	0.05	-0.11	0.08	1.00											
10. R&D intensity	0.14	0.22	0.34	-0.01	0.02	0.01	0.05	-0.08	0.06	-0.05	-0.31	1.00										
11. Capital intensity	0.04	0.04	0.09	-0.05	0.08	0.00	0.00	-0.09	0.03	0.04	-0.15	0.16	1.00									
12. Block shareholding	0.10	0.06	-0.06	0.02	0.00	-0.09	0.04	-0.01	-0.01	-0.08	0.02	0.09	-0.03	1.00								
13. CEO tenure	7.72	7.81	-0.01	0.03	-0.09	-0.04	0.01	-0.01	-0.08	0.49	0.00	-0.03	-0.03	-0.08	1.00							
14. Log(sales growth)	0.11	0.25	0.07	0.05	-0.07	-0.10	-0.06	-0.01	-0.04	0.02	-0.02	-0.14	0.08	-0.06	0.06	1.00						
15. Tobin's Q	2.89	1.85	0.12	0.08	0.03	-0.06	-0.21	-0.03	-0.05	0.02	-0.13	0.04	0.18	-0.04	0.02	0.27	1.00					
16. Return on Assets	0.05	0.17	0.00	0.04	-0.03	0.03	-0.12	0.05	0.04	-0.04	0.01	-0.16	-0.15	-0.05	-0.04	0.09	0.23	1.00				
17. Product diversification	0.10	0.24	0.01	0.02	0.16	0.17	0.04	-0.07	0.01	-0.08	-0.13	-0.07	0.00	-0.11	0.07	-0.08	-0.06	-0.04	1.00			
18. Firm size	1.51	1.15	-0.13	-0.26	0.21	0.44	0.13	-0.03	0.16	-0.17	0.09	-0.16	0.02	-0.19	-0.05	-0.13	-0.16	0.11	0.27	1.00		
19. Debt to equity	0.66	9.23	0.04	0.01	0.00	0.04	-0.02	-0.05	0.01	-0.05	0.02	0.19	-0.01	0.05	0.01	0.00	-0.05	-0.02	-0.04	-0.02	1.00	
20. Year clock	7.70	3.57	-0.02	-0.16	0.01	-0.05	-0.03	-0.04	0.01	0.04	-0.08	-0.05	-0.01	-0.02	0.08	-0.07	0.05	0.05	0.04	0.05	0.03	1.00
21. Firm age	19.27	14.26	0.05	-0.09	0.16	0.33	0.12	0.04	0.05	-0.15	-0.10	-0.01	-0.09	-0.05	-0.09	-0.18	-0.15	0.02	0.35	0.59	-0.04	0.14

Table 2: GEE models predicting organizational ambidexterity (t+1)

Variables	**(1)**	**(2)**	**(3)**	**(4)**
CEO cognitive complexity	0.037**	0.041**	0.041**	0.049**
	(0.014)	(0.013)	(0.015)	(0.014)
CEO cog. complexity X TMT func. heterogeneity		0.281+		0.317*
		(0.150)		(0.155)
CEO cog. complexity X Product diversification			-0.133**	-0.160**
			(0.042)	(0.040)
TMT functional heterogeneity	0.401	-0.229	0.428	-0.268
	(0.616)	(0.828)	(0.609)	(0.829)
TMT size	-0.029	-0.020	-0.033	-0.024
	(0.045)	(0.048)	(0.045)	(0.048)
TMT tenure heterogeneity	-0.366+	-0.304	-0.368+	-0.304
	(0.191)	(0.189)	(0.190)	(0.187)
Industry dynamism	3.682	3.511	3.324	3.158
	(5.100)	(4.864)	(5.170)	(4.944)
Fog index	-0.001	-0.001	-0.001	-0.001
	(0.004)	(0.003)	(0.004)	(0.003)
CEO power	-0.035	-0.028	-0.034	-0.025
	(0.026)	(0.025)	(0.026)	(0.025)
R&D missing	-2.491**	-2.545**	-2.493**	-2.555**
	(0.598)	(0.569)	(0.589)	(0.559)
R&D intensity	0.097	0.080	0.106	0.091
	(0.118)	(0.121)	(0.117)	(0.120)
Capital intensity	0.365	0.442	0.356	0.437
	(0.480)	(0.469)	(0.479)	(0.468)
Blockholding	-0.221	-0.152	-0.219	-0.139
	(0.340)	(0.355)	(0.340)	(0.355)
CEO tenure	0.037*	0.038*	0.037*	0.039*
	(0.015)	(0.016)	(0.015)	(0.016)
Sales growth	-0.077	-0.076	-0.075	-0.072
	(0.051)	(0.057)	(0.050)	(0.057)
Tobin's Q	-0.195	-0.202	-0.195	-0.203
	(0.136)	(0.138)	(0.135)	(0.137)
Product diversification	-0.747**	-0.717**	-0.477*	-0.371*
	(0.203)	(0.196)	(0.192)	(0.167)
Firm size	-0.573*	-0.563*	-0.565*	-0.551*
	(0.246)	(0.262)	(0.242)	(0.260)
Debt to equity ratio	-0.005*	-0.004	-0.005*	-0.004+
	(0.002)	(0.002)	(0.002)	(0.002)
Year clock	-0.048*	-0.042*	-0.047*	-0.041*
	(0.020)	(0.020)	(0.019)	(0.019)
Firm age	-0.062**	-0.065**	-0.061**	-0.065**
	(0.014)	(0.015)	(0.014)	(0.015)
Constant	0.828*	0.714+	0.829*	0.702+
	(0.398)	(0.375)	(0.395)	(0.367)
Industry fixed effects	(included)	(included)	(included)	(included)
Observations	927	927	927	927
Wald chi2	828.60**	733.22**	976.06**	845.50**

Robust standard errors in parentheses
** p<0.01, * p<0.05, + p<0.1

Figure 2: Moderating effect of TMT functional heterogeneity on organizational ambidexterity

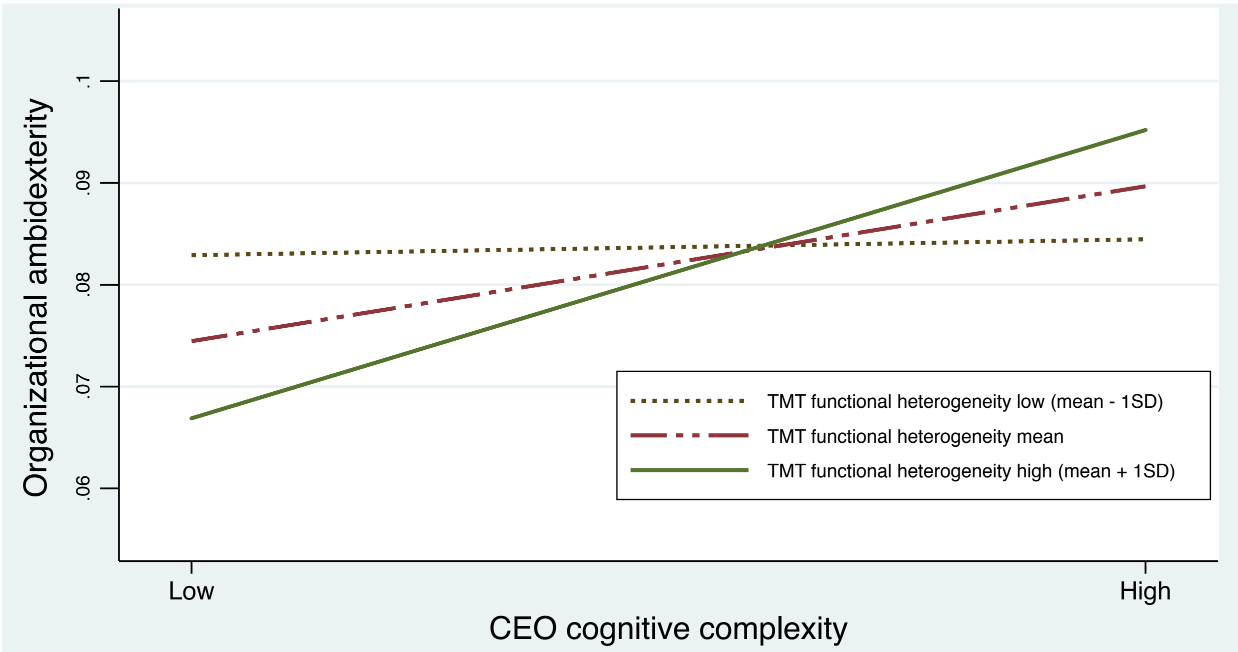


Figure 3: Moderating effect of product diversification on organizational ambidexterity

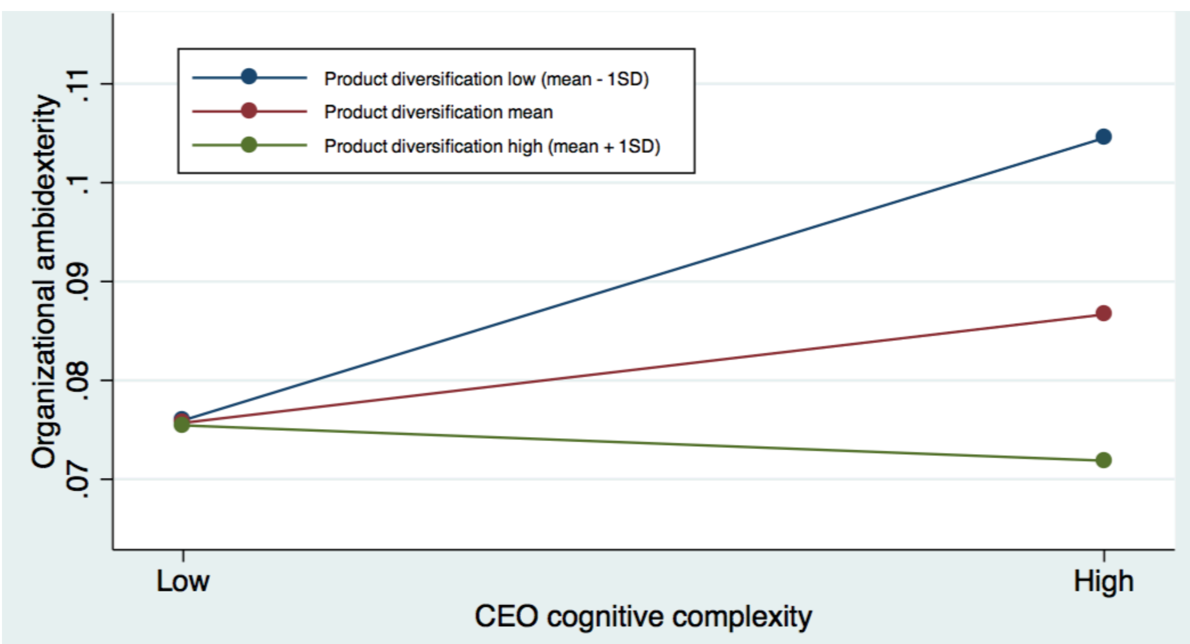


Table 3: GEE models predicting firm performance (t+1)

	(1)	(2)	(3)	(4)
Variables DV:	**Tobin's Q**	**Tobin's Q**	**ROA**	**ROA**
CEO cognitive complexity	0.002	-0.033*	0.001	-0.003
	(0.012)	(0.016)	(0.002)	(0.002)
Org. ambidexterity X CEO cog. complexity		0.204**		0.027**
		(0.040)		(0.009)
Organizational ambidexterity	0.204	-0.062	-0.003	-0.035
	(0.296)	(0.210)	(0.052)	(0.051)
TMT functional heterogeneity	0.166	0.212	-0.012	-0.007
	(0.202)	(0.204)	(0.045)	(0.046)
TMT size	0.022+	0.022+	-0.004	-0.004
	(0.013)	(0.013)	(0.003)	(0.003)
TMT tenure heterogeneity	-0.278**	-0.285**	-0.045+	-0.046+
	(0.103)	(0.105)	(0.026)	(0.026)
Industry dynamism	-0.625	-0.600	-0.033	-0.011
	(2.456)	(2.504)	(0.461)	(0.464)
Fog index	-0.010*	-0.013**	0.001	0.000
	(0.005)	(0.005)	(0.001)	(0.001)
CEO power	0.013	0.014	0.003	0.003
	(0.015)	(0.016)	(0.003)	(0.003)
R&D missing	-0.204	-0.233	-0.050+	-0.050+
	(0.155)	(0.156)	(0.026)	(0.026)
R&D intensity	-0.054	-0.073	-0.176**	-0.177**
	(0.140)	(0.141)	(0.060)	(0.060)
Capital intensity	0.231	0.324	-0.620+	-0.625+
	(0.600)	(0.605)	(0.371)	(0.373)
Blockholding	-0.297	-0.352	0.069	0.062
	(0.547)	(0.558)	(0.086)	(0.085)
CEO tenure	0.004	0.002	-0.001	-0.001
	(0.006)	(0.005)	(0.001)	(0.001)
Sales growth	0.207**	0.220**	0.026	0.026
	(0.077)	(0.068)	(0.036)	(0.035)
Product diversification	0.100	0.123	-0.069	-0.070
	(0.156)	(0.152)	(0.060)	(0.060)
Firm size	-0.146**	-0.162**	0.022*	0.021*
	(0.055)	(0.056)	(0.009)	(0.009)
Debt to equity ratio	-0.001	-0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Year clock	0.010	0.008	-0.000	-0.001
	(0.011)	(0.011)	(0.002)	(0.002)
Firm age	-0.000	0.001	-0.000	-0.000
	(0.004)	(0.004)	(0.001)	(0.001)
Constant	1.482**	1.676**	0.153*	0.169*
	(0.308)	(0.309)	(0.069)	(0.070)
Industry fixed effects	(included)	(included)	(included)	(included)
Observations	925	925	927	927
Wald chi2	38.49*	80.93**	83.44**	90.49**

Robust standard errors in parentheses
** $p<0.01$, * $p<0.05$, + $p<0.1$

Figure 4: Moderating effect of CEO cognitive complexity (dependent variable is Tobin's Q)

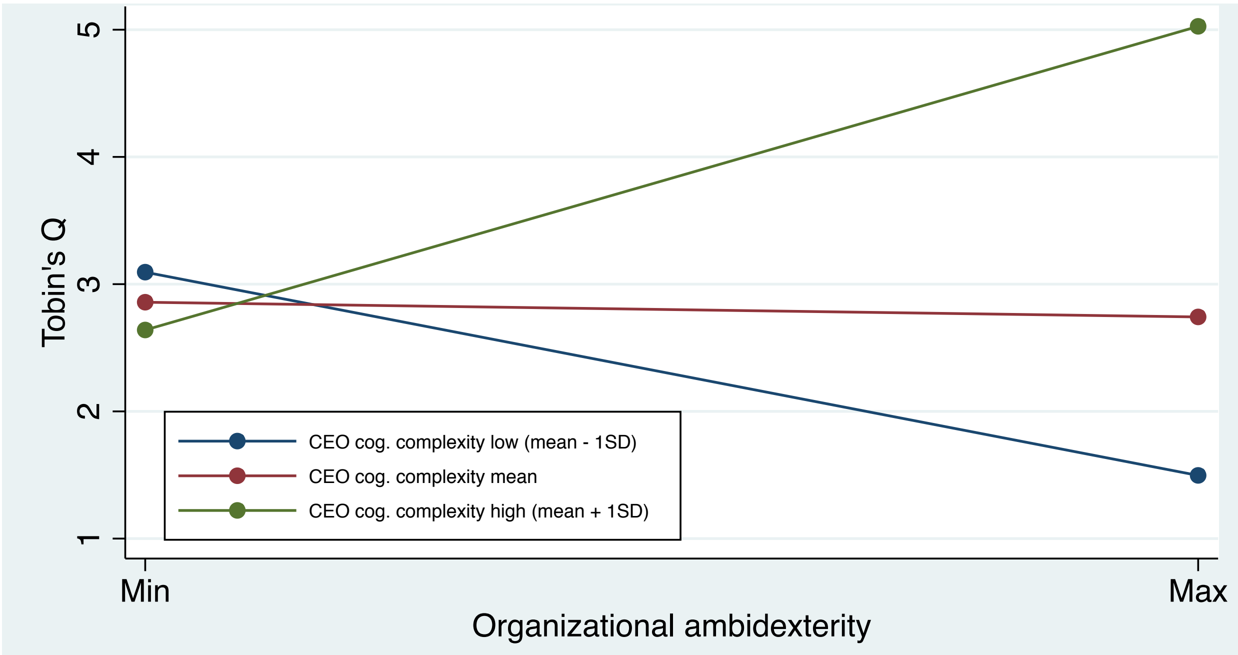


Figure 5: Moderating effect of CEO cognitive complexity (dependent variable is ROA)

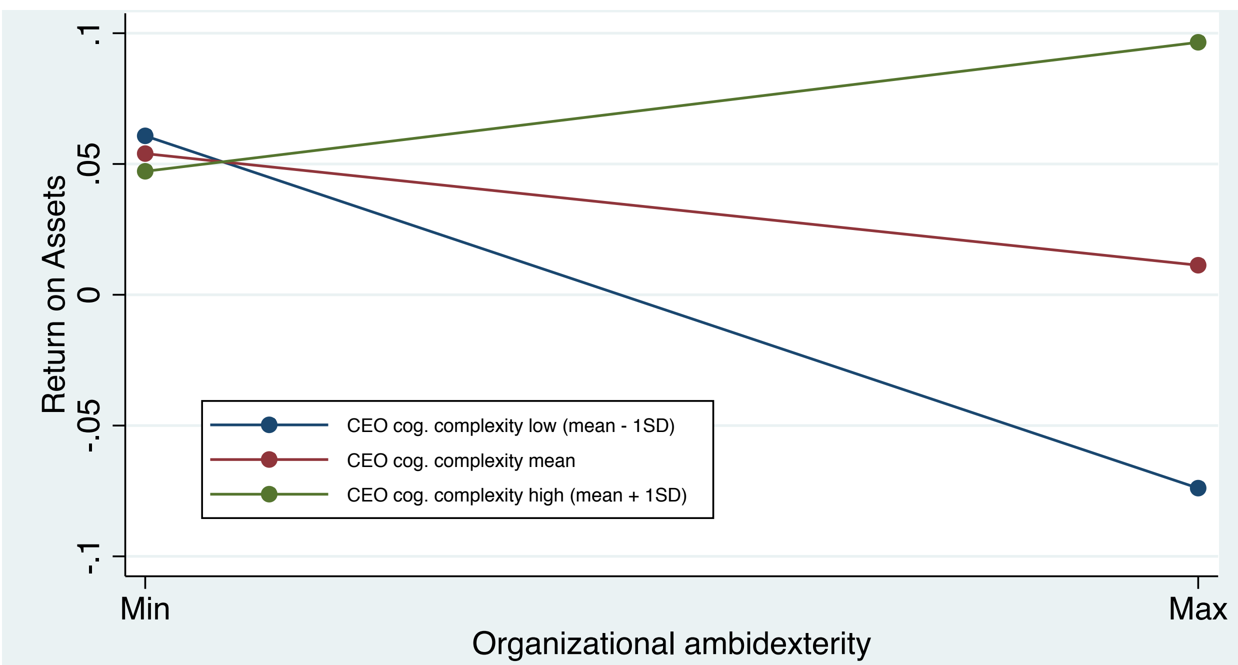


Table 4: GEE models predicting firm performance (t+1): robustness check

	(1)	(2)	(3)	(4)
Variables DV:	**Tobin's Q**	**Tobin's Q**	**ROA**	**ROA**
CEO cognitive complexity	0.002	-0.033*	0.001	-0.003
	(0.012)	(0.016)	(0.002)	(0.002)
Org. ambidexterity X CEO cog. Complexity		0.204**		0.029**
		(0.039)		(0.010)
Organizational ambidexterity	0.318	-0.028	-0.014	-0.073
	(0.616)	(0.504)	(0.114)	(0.124)
Exploration	-0.105	-0.037	-0.019	-0.004
	(0.294)	(0.295)	(0.077)	(0.081)
Exploitation	-0.006	0.008	0.043	0.054
	(0.264)	(0.235)	(0.040)	(0.040)
TMT functional heterogeneity	0.167	0.211	-0.015	-0.011
	(0.203)	(0.205)	(0.045)	(0.046)
TMT size	0.022+	0.022+	-0.004	-0.004
	(0.013)	(0.013)	(0.003)	(0.003)
TMT tenure heterogeneity	-0.281**	-0.285**	-0.045+	-0.046+
	(0.103)	(0.106)	(0.026)	(0.026)
Industry dynamism	-0.582	-0.587	-0.027	-0.015
	(2.442)	(2.490)	(0.462)	(0.466)
Fog index	-0.009+	-0.013**	0.000	0.000
	(0.005)	(0.005)	(0.001)	(0.001)
CEO power	0.013	0.015	0.003	0.003
	(0.015)	(0.016)	(0.003)	(0.003)
R&D missing	-0.214	-0.235	-0.045+	-0.044+
	(0.161)	(0.163)	(0.026)	(0.026)
R&D intensity	-0.045	-0.070	-0.169**	-0.171**
	(0.136)	(0.133)	(0.065)	(0.065)
Capital intensity	0.231	0.321	-0.619+	-0.624+
	(0.603)	(0.605)	(0.374)	(0.376)
Blockholding	-0.294	-0.350	0.073	0.064
	(0.554)	(0.555)	(0.082)	(0.081)
CEO tenure	0.004	0.002	-0.001	-0.002
	(0.006)	(0.005)	(0.001)	(0.001)
Sales growth	0.213**	0.222**	0.028	0.028
	(0.080)	(0.071)	(0.038)	(0.037)
Product diversification	0.102	0.123	-0.068	-0.068
	(0.155)	(0.151)	(0.060)	(0.060)
Firm size	-0.146**	-0.162**	0.022*	0.022*
	(0.055)	(0.057)	(0.009)	(0.009)
Debt to equity ratio	-0.001	-0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Year clock	0.010	0.007	-0.000	-0.001
	(0.011)	(0.011)	(0.002)	(0.002)
Firm age	-0.000	0.001	-0.000	-0.000
	(0.004)	(0.004)	(0.001)	(0.001)
Constant	1.505**	1.682**	0.150*	0.163*
	(0.322)	(0.332)	(0.066)	(0.067)
Industry fixed effects	(included)	(included)	(included)	(included)
Observations	925	925	927	927
Wald chi2	40.96*	88.66**	147.32**	166.10**

Robust standard errors in parentheses
** p<0.01, * p<0.05, + p<0.1

Figure 6: Theoretical model

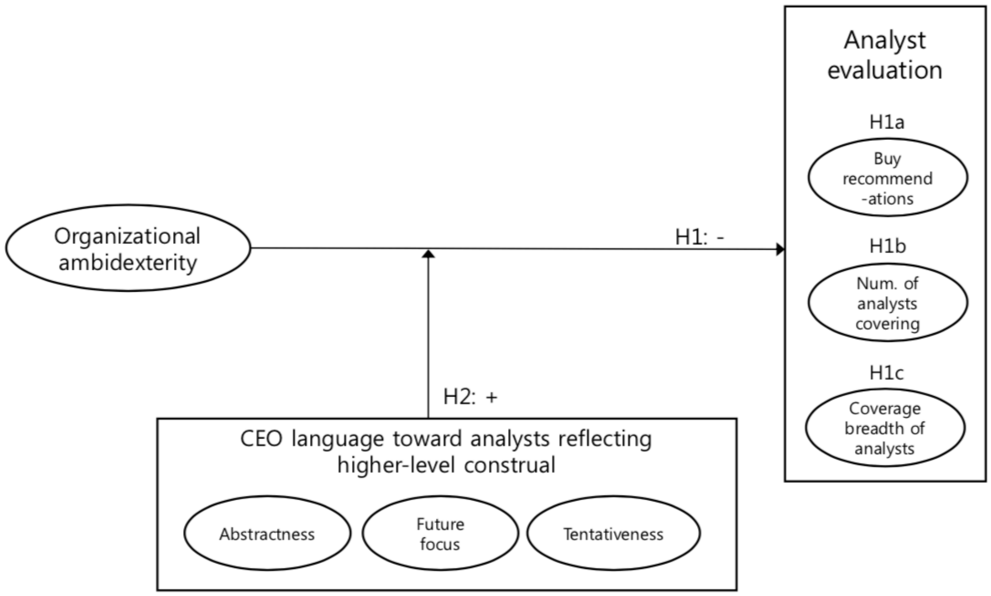


Table 5: Descriptive statistics and correlations

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Organizational ambidexterity	0.15	0.16	1.00																				
2. Mean (buy) recommendation	3.75	0.50	0.02	1.00																			
3. Coverage breadth	15.76	3.47	0.06	-0.01	1.00																		
4. Analyst coverage	11.06	8.78	-0.04	-0.08	0.03	1.00																	
5. CEO positive sentiment	3.41	1.30	0.09	0.01	0.04	0.03	1.00																
6. CEO abstractness	2.40	0.07	0.15	0.03	0.09	0.13	0.18	1.00															
7. CEO future focus	0.00	1.48	0.19	0.06	0.02	0.05	0.09	0.06	1.00														
8. CEO tentativeness	0.04	1.20	0.04	0.00	0.01	-0.16	-0.16	-0.09	-0.01	1.00													
9. Institutional ownership	0.74	0.24	-0.18	-0.03	0.00	0.19	0.00	0.06	-0.12	-0.03	1.00												
10. Firm size	6.50	1.69	-0.15	-0.16	0.02	0.65	0.02	0.05	0.06	-0.15	0.20	1.00											
11. Related diversification	0.06	0.18	-0.03	0.01	0.00	0.15	-0.05	-0.02	-0.06	0.06	-0.07	0.14	1.00										
12. Unrelated diversification	0.04	0.15	0.04	-0.02	-0.08	0.04	0.02	0.03	0.07	0.01	-0.05	0.26	0.06	1.00									
13. Return on Assets	0.05	0.14	-0.12	0.06	-0.04	0.13	-0.08	0.02	-0.10	0.02	0.19	0.23	-0.03	0.01	1.00								
14. R&D intensity	0.16	0.32	0.39	0.08	0.02	0.00	0.20	0.14	0.19	-0.06	-0.06	-0.21	-0.05	-0.07	-0.41	1.00							
15. R&D missing	0.18	0.39	-0.35	0.02	0.02	-0.14	-0.04	-0.21	-0.06	0.07	0.11	0.01	-0.08	-0.10	0.04	-0.24	1.00						
16. Advertising intensity	0.02	0.04	-0.06	-0.02	0.02	0.27	0.05	0.06	0.02	0.00	0.03	0.16	0.01	0.05	0.03	-0.06	0.03	1.00					
17. Tobin's Q	3.01	1.98	0.12	0.09	0.01	0.13	0.03	0.10	-0.03	-0.10	0.05	-0.15	0.00	-0.13	0.18	0.13	-0.12	0.11	1.00				
18. Capital intensity	0.04	0.04	0.17	0.02	-0.03	0.21	0.06	0.06	0.07	-0.07	0.01	0.00	0.02	-0.03	-0.19	0.30	-0.16	0.07	0.19	1.00			
19. Intangible assets	0.30	0.21	-0.30	0.00	0.03	0.07	-0.04	-0.06	-0.07	0.09	0.16	0.24	0.13	0.05	0.02	-0.20	0.21	0.04	-0.37	-0.20	1.00		
20. Financial leverage	0.11	0.16	-0.02	-0.03	0.11	0.02	0.04	0.03	0.06	-0.07	0.04	0.22	0.01	0.07	-0.15	0.08	0.08	0.01	-0.11	0.11	0.19	1.00	
21. Sales growth	0.17	0.52	0.13	0.14	0.05	-0.01	-0.04	0.03	0.05	-0.04	-0.03	-0.11	-0.03	-0.07	0.06	0.03	-0.02	0.07	0.16	0.04	-0.03	0.02	1.00
22. Year clock	9.50	3.63	-0.06	0.09	0.40	0.12	0.04	0.08	0.01	-0.13	-0.01	0.19	0.09	-0.04	0.09	-0.04	-0.06	0.04	0.03	-0.03	0.14	0.12	-0.04

N=1,114 firm-years; correlations greater than |.06| are significant at $p < .05$

Table 6: Fixed effects models predicting mean (buy) recommendations(t+1)

Variables	(1)	(2)	(3)	(4)	(5)
Organizational ambidexterity	-0.344+	-6.736*	-0.390*	-0.383*	-6.989*
	(0.184)	(2.875)	(0.189)	(0.185)	(2.895)
Organizational ambidexterity X CEO verbal abstractness		2.640*			2.717*
		(1.185)			(1.195)
Organizational ambidexterity X CEO future focus			0.066		0.036
			(0.059)		(0.060)
Organizational ambidexterity X CEO tentativeness				0.168*	0.174*
				(0.080)	(0.080)
CEO positive sentiment	0.018	0.013	0.018	0.019+	0.015
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
CEO fog index	-0.004	-0.003	-0.004	-0.004	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Analyst coverage	-0.013**	-0.013**	-0.013**	-0.012**	-0.012**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Institutional ownership	0.038	0.036	0.036	0.038	0.035
	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)
CEO verbal abstractness	-0.241	-0.708*	-0.254	-0.217	-0.705*
	(0.255)	(0.330)	(0.255)	(0.255)	(0.329)
CEO future focus	0.033**	0.032**	0.023+	0.032**	0.026+
	(0.011)	(0.011)	(0.014)	(0.011)	(0.014)
CEO tentativeness	-0.001	0.001	-0.001	-0.027	-0.026
	(0.014)	(0.014)	(0.014)	(0.019)	(0.019)
Firm size	-0.066	-0.072	-0.068	-0.072	-0.079+
	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)
Related diversification	-0.146	-0.154	-0.147	-0.139	-0.148
	(0.111)	(0.111)	(0.111)	(0.111)	(0.111)
Unrelated diversification	-0.680**	-0.684**	-0.677**	-0.690**	-0.694**
	(0.151)	(0.151)	(0.151)	(0.151)	(0.151)
Return on Assets	0.218+	0.240+	0.215+	0.206+	0.227+
	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)
R&D intensity	-0.093	-0.071	-0.097	-0.114+	-0.094
	(0.067)	(0.068)	(0.068)	(0.068)	(0.069)
R&D missing	0.157	0.148	0.151	0.150	0.138
	(0.168)	(0.167)	(0.168)	(0.167)	(0.167)
Advertising intensity	0.108	0.142	0.135	0.124	0.173
	(0.672)	(0.671)	(0.673)	(0.671)	(0.670)
Tobin's Q	0.015	0.015	0.015	0.014	0.015
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Capital intensity	0.709	0.691	0.683	0.725	0.692
	(0.475)	(0.474)	(0.475)	(0.474)	(0.473)
Intangible assets	0.102	0.132	0.099	0.103	0.132
	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)
Financial leverage	-0.133	-0.131	-0.127	-0.137	-0.131
	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)
Sales growth	0.026	0.030	0.025	0.033	0.037
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
Year clock	0.003	0.004	0.003	0.003	0.004
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	4.907**	6.049**	4.958**	4.898**	6.102**
	(0.671)	(0.843)	(0.673)	(0.670)	(0.843)
Observations	1,103	1,103	1,103	1,103	1,103
R-squared	0.079	0.084	0.080	0.083	0.089

Standard errors in parentheses
** p<0.01, * p<0.05, + p<0.1

Table 7: Fixed effects Poisson regression models predicting analyst coverage (t+1)

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Organizational ambidexterity	-0.082	-1.148	-0.024	-0.081	-0.289
	(0.159)	(2.337)	(0.165)	(0.159)	(2.378)
Organizational ambidexterity X CEO verbal abstractness		0.440			0.103
		(0.961)			(0.981)
Organizational ambidexterity X CEO future focus			-0.072		-0.052
			(0.056)		(0.057)
Organizational ambidexterity X CEO tentativeness				-0.221**	-0.211**
				(0.073)	(0.075)
CEO positive sentiment	-0.006	-0.007	-0.007	-0.007	-0.008
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
CEO fog index	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Institutional ownership	0.052	0.052	0.058	0.044	0.049
	(0.073)	(0.073)	(0.073)	(0.074)	(0.074)
CEO verbal abstractness	0.421*	0.341	0.422*	0.375+	0.361
	(0.195)	(0.261)	(0.195)	(0.195)	(0.262)
CEO future focus	0.006	0.006	0.016	0.006	0.014
	(0.009)	(0.009)	(0.012)	(0.009)	(0.012)
CEO tentativeness	0.009	0.010	0.009	0.044**	0.042**
	(0.011)	(0.011)	(0.011)	(0.016)	(0.016)
Firm size	0.370**	0.369**	0.371**	0.374**	0.375**
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Related diversification	0.063	0.063	0.063	0.064	0.064
	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)
Unrelated diversification	-0.162	-0.160	-0.163	-0.154	-0.154
	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)
Return on Assets	0.126	0.133	0.126	0.167	0.166
	(0.108)	(0.109)	(0.108)	(0.109)	(0.110)
R&D intensity	0.143*	0.151*	0.152*	0.199**	0.205**
	(0.061)	(0.063)	(0.061)	(0.064)	(0.066)
R&D missing	-0.054	-0.055	-0.047	-0.050	-0.045
	(0.168)	(0.168)	(0.168)	(0.168)	(0.169)
Advertising intensity	0.001	0.005	-0.018	0.089	0.072
	(0.483)	(0.483)	(0.483)	(0.485)	(0.485)
Tobin's Q	0.025**	0.025**	0.025**	0.025**	0.025**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Capital intensity	1.121**	1.108**	1.142**	1.078**	1.094**
	(0.365)	(0.366)	(0.365)	(0.363)	(0.365)
Intangible assets	0.187*	0.190*	0.192*	0.177+	0.182+
	(0.094)	(0.095)	(0.094)	(0.094)	(0.095)
Financial leverage	-0.120	-0.118	-0.123	-0.106	-0.109
	(0.089)	(0.089)	(0.089)	(0.089)	(0.089)
Sales growth	-0.043+	-0.041+	-0.042+	-0.048*	-0.047+
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Year clock	-0.024**	-0.024**	-0.024**	-0.024**	-0.024**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Observations	1,114	1,114	1,114	1,114	1,114
Wald chi2	269.01**	269.17**	271.30**	277.87**	279.19**

Standard errors in parentheses
** p<0.01, * p<0.05, + p<0.1

Table 8: Fixed effects regression models predicting coverage breadth (t+1)

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Organizational ambidexterity	-0.818	34.278+	-0.980	-0.695	43.313*
	(1.248)	(20.287)	(1.278)	(1.250)	(20.750)
Organizational ambidexterity X CEO verbal abstractness		-14.524+			-18.315*
		(8.380)			(8.580)
Organizational ambidexterity X CEO future focus			0.235		0.420
			(0.401)		(0.407)
Organizational ambidexterity X CEO tentativeness				-0.807	-1.082+
				(0.566)	(0.578)
CEO positive sentiment	0.031	0.056	0.033	0.025	0.058
	(0.075)	(0.077)	(0.075)	(0.075)	(0.077)
CEO fog index	-0.077*	-0.078**	-0.077*	-0.074*	-0.076*
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Analyst coverage	0.011	0.011	0.011	0.008	0.007
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Institutional ownership	-1.111+	-1.106+	-1.118+	-1.117+	-1.128+
	(0.627)	(0.626)	(0.627)	(0.627)	(0.626)
CEO verbal abstractness	5.018**	7.495**	4.972**	4.831**	7.808**
	(1.718)	(2.233)	(1.720)	(1.722)	(2.236)
CEO future focus	-0.065	-0.058	-0.098	-0.060	-0.110
	(0.076)	(0.076)	(0.095)	(0.076)	(0.095)
CEO tentativeness	0.070	0.058	0.070	0.192	0.217+
	(0.097)	(0.097)	(0.097)	(0.129)	(0.130)
Firm size	0.467	0.492	0.462	0.495+	0.529+
	(0.300)	(0.300)	(0.300)	(0.300)	(0.300)
Related diversification	0.382	0.429	0.380	0.353	0.399
	(0.742)	(0.742)	(0.742)	(0.742)	(0.741)
Unrelated diversification	-2.667**	-2.653**	-2.659**	-2.623*	-2.575*
	(1.019)	(1.018)	(1.019)	(1.019)	(1.018)
Return on Assets	-1.804*	-1.908*	-1.805*	-1.737*	-1.847*
	(0.834)	(0.835)	(0.834)	(0.835)	(0.835)
R&D intensity	0.636	0.512	0.623	0.734	0.589
	(0.455)	(0.460)	(0.455)	(0.459)	(0.463)
R&D missing	-0.972	-0.927	-0.993	-0.939	-0.907
	(1.130)	(1.129)	(1.131)	(1.130)	(1.129)
Advertising intensity	5.145	4.959	5.245	5.059	4.973
	(4.528)	(4.524)	(4.532)	(4.525)	(4.522)
Tobin's Q	-0.001	-0.001	0.001	0.004	0.007
	(0.066)	(0.066)	(0.066)	(0.066)	(0.066)
Capital intensity	-6.915*	-6.762*	-7.003*	-6.950*	-6.928*
	(3.200)	(3.198)	(3.204)	(3.198)	(3.197)
Intangible assets	-0.236	-0.405	-0.249	-0.243	-0.481
	(0.835)	(0.840)	(0.836)	(0.835)	(0.840)
Financial leverage	0.815	0.777	0.840	0.813	0.808
	(0.788)	(0.788)	(0.790)	(0.788)	(0.788)
Sales growth	-0.340+	-0.361+	-0.344+	-0.372+	-0.416*
	(0.194)	(0.194)	(0.194)	(0.195)	(0.195)
Year clock	0.300**	0.297**	0.300**	0.300**	0.296**
	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)
Constant	2.327	-3.733	2.505	2.525	-4.732
	(4.496)	(5.692)	(4.508)	(4.496)	(5.707)
Observations	1,106	1,106	1,106	1,106	1,106
R-squared	0.221	0.223	0.221	0.222	0.227

Standard errors in parentheses
** p<0.01, * p<0.05, + p<0.1

Figure 7: Moderating effect of CEO verbal abstractness (dependent variable is analyst mean recommendation)

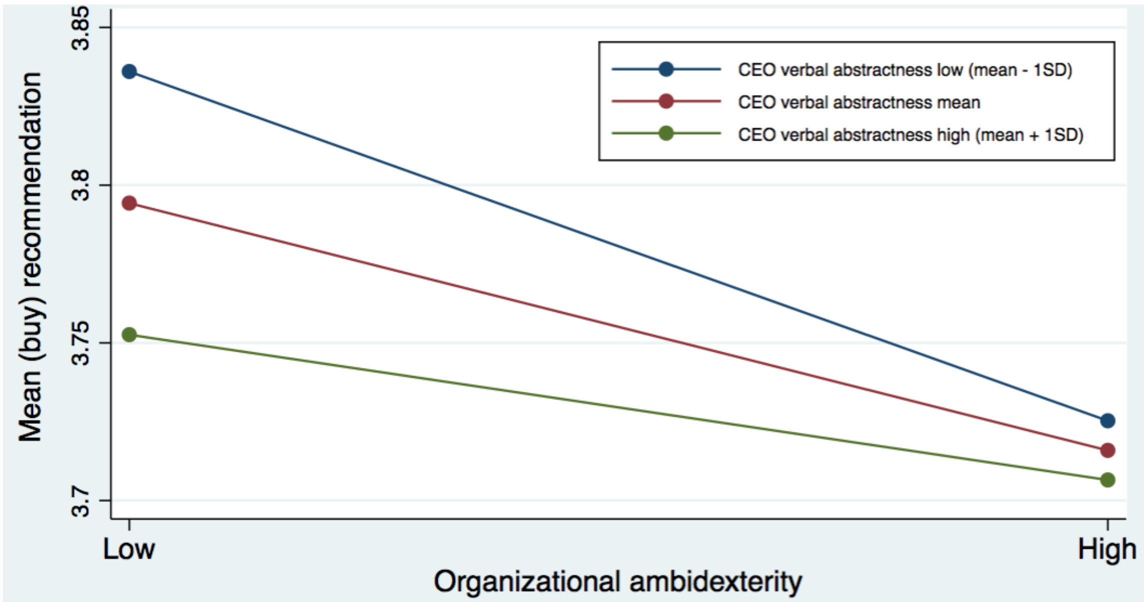


Figure 8: Moderating effect of CEO verbal tentativeness (dependent variable is analyst mean recommendation)

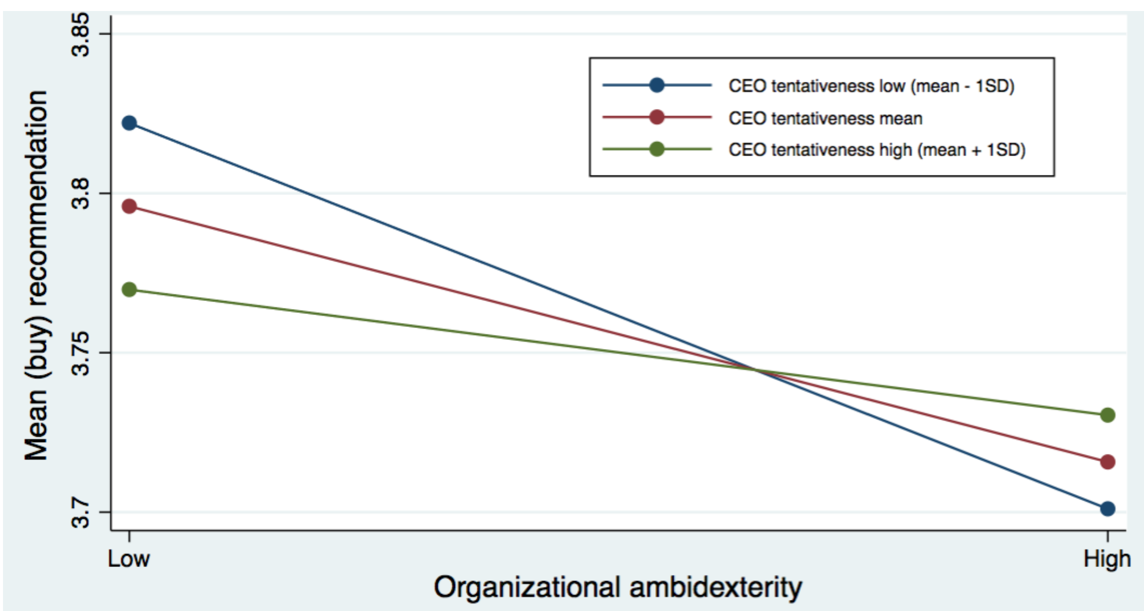


Table 9: Fixed effects models predicting analyst evaluation: robustness check

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**Mean buy rec.**	**Mean buy rec.**	**Analyst coverage**	**Analyst coverage**	**Coverage breadth**	**Coverage breadth**
Organizational ambidexterity	-0.351	-6.241*	-0.767*	-1.347	2.068	44.650*
	(0.391)	(2.921)	(0.343)	(2.460)	(2.640)	(21.002)
Org. ambidexterity X CEO abstractness		2.404*		0.246		-17.728*
		(1.201)		(0.996)		(8.642)
Org. ambidexterity X CEO future focus		0.029		-0.029		0.381
		(0.060)		(0.059)		(0.409)
Org. ambidexterity X CEO tentativeness		0.188*		-0.219**		-1.101+
		(0.080)		(0.075)		(0.579)
Exploration	0.194	0.188	0.381*	0.383*	-1.944	-1.810
	(0.214)	(0.214)	(0.170)	(0.172)	(1.443)	(1.447)
Exploitation	-0.291	-0.276	0.269	0.277	-0.966	-0.953
	(0.206)	(0.207)	(0.165)	(0.171)	(1.393)	(1.404)
CEO positive sentiment	0.018	0.016	-0.002	-0.005	0.017	0.044
	(0.011)	(0.012)	(0.008)	(0.008)	(0.076)	(0.078)
CEO fog index	-0.003	-0.003	-0.003	-0.003	-0.079**	-0.078*
	(0.004)	(0.004)	(0.003)	(0.003)	(0.030)	(0.030)
Analyst coverage	-0.013**	-0.012**			0.013	0.008
	(0.004)	(0.004)			(0.027)	(0.027)
Institutional ownership	0.036	0.033	0.063	0.058	-1.163+	-1.177+
	(0.093)	(0.093)	(0.073)	(0.074)	(0.629)	(0.628)
CEO verbal abstractness	-0.274	-0.678*	0.388*	0.302	5.251**	7.926**
	(0.256)	(0.329)	(0.195)	(0.264)	(1.727)	(2.242)
CEO future focus	0.032**	0.026+	0.006	0.010	-0.065	-0.104
	(0.011)	(0.014)	(0.009)	(0.012)	(0.076)	(0.095)
CEO tentativeness	0.002	-0.026	0.009	0.043**	0.068	0.218+
	(0.014)	(0.019)	(0.011)	(0.016)	(0.098)	(0.130)
Firm size	-0.058	-0.070	0.373**	0.378**	0.443	0.508+
	(0.045)	(0.046)	(0.031)	(0.032)	(0.301)	(0.301)
Related diversification	-0.152	-0.151	0.071	0.071	0.305	0.323
	(0.112)	(0.111)	(0.071)	(0.071)	(0.745)	(0.744)
Unrelated diversification	-0.653**	-0.669**	-0.149	-0.140	-2.666**	-2.571*
	(0.151)	(0.151)	(0.117)	(0.118)	(1.022)	(1.021)
Return on Assets	0.244*	0.248*	0.130	0.173	-1.852*	-1.883*
	(0.124)	(0.124)	(0.108)	(0.110)	(0.837)	(0.838)
R&D intensity	-0.101	-0.106	0.134*	0.196**	0.717	0.674
	(0.068)	(0.069)	(0.061)	(0.066)	(0.459)	(0.469)
R&D missing	0.144	0.126	-0.026	-0.018	-1.090	-1.018
	(0.168)	(0.168)	(0.169)	(0.170)	(1.136)	(1.135)
Advertising intensity	0.163	0.219	-0.027	0.054	5.369	5.181
	(0.672)	(0.670)	(0.482)	(0.484)	(4.538)	(4.532)
Tobin's Q	0.015	0.015	0.024**	0.025**	-0.001	0.006
	(0.010)	(0.010)	(0.007)	(0.007)	(0.066)	(0.066)
Capital intensity	0.759	0.747	1.157**	1.115**	-7.118*	-7.105*
	(0.474)	(0.473)	(0.364)	(0.364)	(3.205)	(3.203)
Intangible assets	0.106	0.133	0.181+	0.175+	-0.280	-0.514
	(0.124)	(0.124)	(0.094)	(0.095)	(0.836)	(0.841)
Financial leverage	-0.126	-0.125	-0.121	-0.108	0.830	0.822
	(0.117)	(0.116)	(0.089)	(0.090)	(0.789)	(0.788)
Sales growth	0.025	0.036	-0.044+	-0.048+	-0.329+	-0.404*
	(0.029)	(0.029)	(0.024)	(0.025)	(0.194)	(0.196)
Year clock	0.003	0.004	-0.024**	-0.024**	0.300**	0.295**
	(0.006)	(0.006)	(0.005)	(0.005)	(0.038)	(0.038)
Constant	4.939**	5.990**			2.737	-4.120
	(0.672)	(0.845)			(4.513)	(5.732)
Observations	1,103	1,103	1,114	1,114	1,106	1,106
R-squared	0.085	0.094			0.222	0.228

Standard errors in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix

McKenny et al. (Forthcoming) exploration and exploitation dictionary

Category	Word/phrase list
Exploration	Beta-phase, beta-testing, breakthrough, breakthroughs, clinical studies, clinical study, clinical test, clinical testing, clinical tests, clinical trial, clinical trials, creative, develop, developed, developing, development, developmental, developments, develops, experiment, experimental, experimentalism, experimentalist, experimentalists, experimentalize, experimentally, experimentarian, experimentarians, experimentation, experimentations, experimentative, experimentator, experimented, experimenter, experimenters, experimenting, experimentist, experimentists, experimentor, experimentors, experiments, innovate, innovated, innovates, innovating, innovation, innovations, innovative, innovativeness, innovator, innovators, innovatory, inventions, IPR&D, IPRD, laboratories, laboratory, labs, launch, launched, launches, launching, new drug, new drugs, new generic product, new generic products, new mobile product, new mobile products, new offering, new offerings, new product, new products, new program, new programming, new programs, new system, new systems, new technologies, new technology, novel, patent application, patent applications, patent development, patent developments, Phase 1, Phase 1a, Phase 1b, Phase 2, Phase 2a, Phase 2b, Phase 3, Phase 4, Phase I, Phase I/II, Phase Ia, Phase Ib, Phase II, Phase IIa, Phase IIb, Phase III, Phase IV, pioneer, pioneered, preclinical, pre-clinical, proof of concept, prototype, prototypes, prototyping, R&D, research, researching, unveiled
Exploitation	Adaptations, advertising, commercialization, commercialize, commercialized, commercializes, commercializing, commoditized, commoditizing, current offering, current offerings, current product, current products, efficience, efficiencies, efficiency, efficient, efficiently, existing offering, existing offerings, existing product, existing products, existing technology, exploit, exploitability, exploitable, exploitation, exploitational, exploitationally, exploitations, exploitative, exploitatively, exploitatory, exploited, exploiting, exploitive, exploitively, exploits, exploiture, extension, extensions, implement, implementable, implemental, implementation, implementations, implemented, implementer, implementers, implementing, implementor, implementors, implements, integrate, integration, maintenance, manufacture, manufactured, manufacturing, marketed, marketing, new features, new formulation, new formulations, new indication, new indications, optimization, optimize, optimized, optimizes, optimizing, optimum, produce, produced, produces, producing, production, productions, productivity, promotion, promotional, promotions, redesign, reengineering, re-engineering, refine, refined, refinedly, refinedness, refinement, refinements, refines, refining, reformulated, reformulating, reformulation, refreshed, re-launch, replicated, replication, replicators, retooled, salesforce, salespeople, salespersons, standardized, streamline, throughput, upgrade, upgraded, upgrades, upgrading, version, versions

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Vita

Seung-Hwan Jeong received his Ph.D. in Management, with a concentration in Strategic Management, from The University of Texas at Austin's McCombs School of Business. He also has received a M.S. in Management and a Bachelor of Business Administration from Korea University, South Korea. In August 2018, Seung will take up a position as Assistant Professor at Georgia State University's Robinson College of Business. Seung's research interests are in behavioral strategy, with a focus on how top executives' cognition, decision-making, and communications influence organizational strategies and stakeholders. In his dissertation, he examines CEOs' cognitive complexity and how it may help firms to achieve and benefit from organizational ambidexterity. His work to date has been published in the *Academy of Management Journal* and the *Academy of Management Best Paper Proceedings*.

Seung was born in South Korea, and he spent six years of his childhood in the U.S., in the state of New Jersey, during his father's Ph.D. studies. After that, he returned to South Korea and spent most of his childhood in Daejeon, a city known for its vibrant scientific community, and graduated from Daedeok Middle School and Daejeon Mannyon High School. He moved to the capital city of Seoul in 2002 to attend Korea University, and during 2005-2007 he served as a military interpreter in the army. In 2012, at the age of 29, Seung eventually made his way back to the United States for his own doctoral studies, and the rest is history.

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